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**Five-Year Review Report**  
**Second Five-Year Review Report**  
**for**  
**Crater Resources Superfund Site**  
**Upper Merion Township**  
**Montgomery County, Pennsylvania**  
**September, 2011**

**PREPARED BY:**

**U.S. Environmental Protection Agency**  
**Region III**  
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# Five-Year Review Report

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## **List of Acronyms**

Alan Wood	Alan Wood Steel Company
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BOS	Board of Supervisors
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
Crater PRP Group	Beazer East, Inc; Keystone Coke Company, Inc.; and Vesper Corporation
CSFA	Cinder/Slag Fill Area
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ESPC	Erosion and Sediment Pollution Control
FDA	Former Dump Area
FFS	Focused Feasibility Study
FRA	Focused Risk Assessment
FYR	Five Year Review
GPR	Ground Penetrating Radar
GPRA	Government Performance Results Act
HEID	Determine Human Exposure Control Status
HEUC	Current Human Exposure Controlled
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICs	Institutional Controls
IRDR	Interim Remedial Design Report
IRIS	Integrated Risk Information System

Keystone Coke	Keystone Coke Company
LDP	Land Development Plan
Liberty	Liberty Property Limited Partnership and Liberty Property Trust
LPT	Liberty Property Trust
MCCD	Montgomery County Conservation District
MCHD	Montgomery County Health Department
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
MSCs	Medium Specific Concentrations
NCP	National Contingency Plan (the “National Oil and Hazardous Substances Pollution Contingency Plan”)
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
O’Neill	O’Neill Properties LLP
OU	Operable Unit
PA	Preliminary Assessment
PADEP	Pennsylvania Department of Environmental Protection
PADEP AOC	Pennsylvania Department of Environmental Protection Area of Concern
PADER	Pennsylvania Department of Environmental Resources
PADOH	Pennsylvania Department of Health
PAH	Polynuclear Aromatic Hydrocarbons
PDI	Pre-Design Investigation
Penn E&R	Penn Environmental & Remediation, Inc.
PID	Photoionization Detector
PRP	Potentially Responsible Party
RA	Remedial Action
RAWP	Remedial Action Work Plan
RAO	Remedial Action Objective

RBCs	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RLA	Renaissance Land Associates
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SI	Site Inspection
Site	Crater Resources Superfund Site
SPA	Southeast Property Area
SVOCs	Semi-Volatile Organic Compounds
SWRAU	Site-Wide Ready for Anticipated Use
UAO	Unilateral Administrative Order
UCL	Upper Confidence Limit
UMR	Upper Merion Reservoir
UMT	Upper Merion Township
VOCs	Volatile Organic Compounds
WAL	Waste Ammonia Liquor

## Executive Summary

The remedy for the Crater Resources Superfund Site in Upper Merion Township, Pennsylvania includes removal of all contaminated soils and sediment in Quarry 3; construction of a cap to prevent infiltration of surface water into the contaminated soils of Quarries 1, 2 and 4 and other contaminated soil areas; Monitored Natural Attenuation (MNA) of the groundwater; further investigation of the former Waste Ammonia Liquor (WAL) pipeline; and Institutional Controls (ICs).

The site consists of ten (10) Operable Units (OUs). Clean-up is complete at Quarry 3 (OU3), the WAL pipeline (OU5), the Cinder/Slag Fill Area (CSFA) (OU7), Area 6/Lot 44 (OU8), the Southeast Property Area (OU9), and Lot 7 (OU10). The Remedial Design (RD) for Quarry 1 (OU1) and Quarry 2 (OU2) is complete and Remedial Action (RA) is underway. Wastes at OU1 and OU2 have been placed under a temporary cap. Investigation at Quarry 4 (OU4) and sampling for MNA of the groundwater (OU6) are ongoing. The required ICs for the Site have been identified and are partially in place. An Institutional Controls Work Plan has been drafted to identify and coordinate the development of ICs with the various property owners at the site. The trigger for this five-year review was the signature date of the first five year review for the site on September 15, 2006.

The assessment of this five-year review (FYR) found that the work completed to-date has been constructed in accordance with the requirements of the Record of Decision (ROD) dated September 27, 2000. The remedy, where constructed, is functioning as designed. When construction of the entire remedy is complete and groundwater cleanup goals are achieved through Monitored Natural Attenuation, the remedy will be protective of human health and the environment.

The remedy is being implemented in accordance with the ROD. Remedial Action has been completed at several OUs (OU3, OU5, OU7, OU8, OU9, and OU10) and work is underway at OU1 and OU2. A demonstration project is underway to evaluate the need for a cap on Quarry 4 (OU4), and sampling has been initiated to evaluate the MNA groundwater remedy (OU6). While no one is currently using groundwater in the vicinity of the site as a source of drinking water, a determination regarding the short-term protectiveness of the groundwater remedy is being deferred until further information is obtained regarding the potential for vapor intrusion at the commercial office buildings that currently exist or are proposed to be constructed adjacent to Quarries 1 and 2 or above the groundwater plume. The time required to collect the air quality data, evaluate the information, and submit a report to EPA and PADEP will be about eighteen months for the existing buildings. After EPA and PADEP have reviewed the data and report, EPA will make a protectiveness determination regarding the vapor intrusion pathway. EPA expects the site will be fully protective of human health and the environment when the groundwater cleanup goals are met, all institutional controls are in place, and all the contaminated soils are either capped or removed for off-site disposal.

### **Government Performance Results Act (GPRA) Measure Review**

As part of this Five Year Review the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

#### **Environmental Indicators**

Human Health: This indicator was changed to Insufficient Data to Determine Human Exposure Control Status (HEID) from Current Human Exposure Controlled (HEUC).

Groundwater Migration: This indicator will remain as Groundwater Migration Under Control (GMUC).

#### **Site-Wide Ready for Anticipated Reuse (SWRAU)**

This measure will remain as being not considered Site-Wide Ready for Anticipated Use (SWRAU) due to the changes in the Environmental Indicators noted above and since not all institutional controls are in place at the site.



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## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Crater Resources Superfund Site		
EPA ID (from WasteLAN): PAD980419097		
Region: 3	State: PA	City/County: Upper Merion Township/Montgomery County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: N/A	
Has site been put into reuse? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Joseph McDowell		
Author title: Remedial Project Manager	Author affiliation: U.S. EPA Reg. 3, HSCD	
Review period:** 12/15/2010 to 9/15/2011		
Date(s) of site inspection: 4/13/11		
Type of review: <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span><input checked="" type="checkbox"/> Post-SARA</span> <span><input type="checkbox"/> Pre-SARA</span> <span><input type="checkbox"/> NPL-Removal only</span> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span><input type="checkbox"/> Non-NPL Remedial Action Site</span> <span><input type="checkbox"/> NPL State/Tribe-lead</span> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span><input type="checkbox"/> Regional Discretion</span> </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Actual RA Onsite Construction at OU # _____</span> <span><input type="checkbox"/> Actual RA Start at OU# _____</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Construction Completion</span> <span><input checked="" type="checkbox"/> Previous Five-Year Review Report</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Other (specify)</span> </div>		
Triggering action date (from WasteLAN): 9/15/2006		
Due date (five years after triggering action date): 9/15/2011		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## Five-Year Review Summary Form, cont'd.

### Issues:

1. Potential for vapor intrusion at existing or proposed buildings adjacent to Quarries 1 and 2 or above the groundwater plume
2. Institutional controls have not been fully implemented across the site

### Recommendations and Follow-up Actions:

1. Conduct vapor intrusion assessment at potentially impacted buildings
2. Finalize institutional Controls

### Protectiveness Statement(s):

The remedy is being implemented in accordance with the ROD. Remedial Action has been completed at several OUs (OU3, OU5, OU7, OU8, OU9, and OU10) and work is underway at OU1 and OU2. A demonstration project is underway to evaluate the need for a cap on Quarry 4 (OU4), and sampling has been initiated to evaluate the MNA groundwater remedy (OU6). While no one is currently using groundwater in the vicinity of the site as a source of drinking water, a determination regarding the short-term protectiveness of the groundwater remedy is being deferred until further information is obtained regarding the potential for vapor intrusion at the commercial office buildings that currently exist or are proposed to be constructed adjacent to Quarries 1 and 2 or above the groundwater plume. The time required to collect the air quality data, evaluate the information, and submit a report to EPA and PADEP will be about eighteen months for the existing buildings. After EPA and PADEP have reviewed the data and report, EPA will make a protectiveness determination regarding the vapor intrusion pathway. EPA expects the site will be fully protective of human health and the environment when the groundwater cleanup goals are met, all institutional controls are in place, and all the contaminated soils are either capped or removed for off-site disposal.

### Other Comments:

N/A

# Five-Year Review Report

## I. Introduction

The purpose of the five-year review is to determine whether the remedy at a Site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this five-year review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency Region 3 has conducted a five-year review of the remedial actions implemented at the Crater Resources Superfund Site in Upper Merion Township, PA. This review was conducted from 12/15/2010 through 9/15/2011. This report documents the results of the review.

This is the second five-year review for the Crater Resources Site. The triggering action for this review is the date of the signature of the first Five-Year Review on September 15, 2006. The five-year review at this Site was specifically activated because hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unlimited use and unrestricted exposure.

## II. Site Chronology

The table below summarizes important events and relevant dates in the chronology of the Crater Resources Site.

**Table 1: Chronology of Site Events**

<b>Event</b>	<b>Date</b>
Alan Wood Steel Company (Alan Wood) and its successors operated a coke and coke byproduct manufacturing facility in nearby Swedeland, Pennsylvania. Wastewater discharged to Quarries 1, 2, and 3 at the Crater Resources Site.	1918 - 1977
Pennsylvania Department of Health (PADOH) initiated an environmental investigation that was carried through by the Pennsylvania Department of Environmental Resources (PADER).	1969 - 1980
Alan Wood installed a prototype treatment plant to treat its industrial wastes and discharge them to the Schuylkill River.	1975
Alan Wood signed a Consent Order with PADER, in which Alan Wood agreed to achieve specified effluent limitations for the phenol and cyanides in its discharges before October 31, 1979. Until those limitations were met, Alan Wood was allowed to continue to discharge its effluents to Quarry 3.	11/26/1975
Alan Wood filed for bankruptcy, the facility and property were first leased and subsequently sold to the Keystone Coke Company (Keystone Coke).	1977
Discharges to Quarry 3 ceased until Keystone Coke signed a Consent Order with PADER, and thereafter reactivated the plant.	4/24/1978
Keystone Coke produced and sold coke at the facility until the spring of 1981, when all operations at the facility ceased.	1978 - 1981
PADER sampled the Waste Ammonia Liquor (WAL) discharges to Quarry 3, groundwater discharges at neighboring quarries in the region, and area wells.	1977 - 1979
EPA conducted a Groundwater Monitoring Survey which involved sampling of Quarry 3 and the surrounding area and included an investigation of possible sources of contamination threatening the Upper Merion Reservoir (UMR).	5/16/1979
EPA conducted a Preliminary Assessment (PA) of the Site, followed by a Site Inspection (SI), during which samples were obtained from Quarry 3	1983
The Site was proposed and listed on the National Oil and Hazardous Substances Pollution Contingency Plan National Priorities List (NPL) of uncontrolled hazardous substances releases.	1992
Beazer East, Inc., Keystone Coke Company, Inc., and Vesper Corporation entered into an Administrative Order on Consent with EPA to perform a Remedial Investigation/ Feasibility Study (RI/FS) at the Site to determine the nature and extent of the contamination at or from the Site	9/17/1994
RI Report approved by EPA.	6/23/1999

EPA completed a Human Health Risk Assessment (HHRA), which is documented in the Final Baseline Risk Assessment Report, to evaluate the human health risks.	12/14/1999
EPA reviewed the Draft FS report and completed an Addendum to the FS Report.	6/16/2000
EPA issued Record of Decision (ROD).	9/27/2000
Administrative Order issued to Beazer East, Inc.; Keystone Coke Company, Inc.; Crater Resources, Inc.; Each Parcel As Is, Inc.; Gulph Mills Golf Club, Inc.; Liberty Property Limited Partnership; Liberty Property Trust, R-T Option Corporation; and Vesper Corporation to conduct the Remedial Design and Remedial Action.	4/30/2001
Remedial Design start.	6/1/2001
Pre-Design Work Plan for Quarry 1 and Quarry 2 (OU1 and OU2) approved by EPA.	7/3/2001
Remedial Action on-site construction start - Operable Unit (OU) 7.	9/17/2001
EPA approves Remedial Design/Remedial Action Work Plan for the Cinder/Slag Fill Area (CSFA) (OU7).	10/29/2001
Pre-Design Investigation (PDI) Report for Quarry 1 and Quarry 2 (OU1 and OU2) approved by EPA.	12/3/2001
Remedial Design Work Plan for Quarry 3 (OU3) approved by EPA.	4/14/2003
Remedial Design Work Plan for Area 6 (OU8) approved by EPA.	8/20/2003
Quarry 3 Pre-Design Investigation conducted by Crater Resources Cooperating Respondent Group [the "Potentially Responsible Party (PRP) Group"].	6/16/2003-9/15/2003
Remedial Action Report for Cinder Slag Fill Area (OU7) approved by EPA.	9/30/2003
Area 6/Lot 44 (OU8) Pre-Design Investigation Work Plan and Addendum approved by EPA.	4/20/2004
Remedial Design Work Plan for the Quarry 4 (OU4) Demonstration Project approved by EPA.	6/29/2004
Revised Retention Basin Sampling and Analysis Plan approved by EPA.	1/11/2005
Remedial Design Work Plan for the WAL Pipeline (OU5) at 3000 Horizon Drive approved by EPA.	3/1/2005
Remedial Design Work Plan for Quarry 1 and Quarry 2 (OU1 and OU2) approved by EPA.	5/24/2005
Remedial Design Work Plan for WAL Pipeline at Quarry 2 approved by EPA.	7/21/2005
Remedial Action Work Plan (RAWP) for WAL Pipeline Removal (OU5) at 3000 Horizon Boulevard approved by EPA.	2/8/2006
MNA (OU6) Pre-Design Investigation Work Plan approved by EPA.	4/13/2006
Remedial Action Work Plan Addendum for WAL Pipeline Removal (OU5) at 3000 Horizon Boulevard approved by EPA.	5/25/2006
Institutional Controls Work Plan submitted.	7/16/2006
EPA issues first Five-Year Review.	9/15/2006
EPA approves Report of Investigations and Risk Assessments for 4 Areas of Concern (AOCs) at Quarries 1 and 2 (OU1 and OU2).	12/19/2006
Remedial Action Report for WAL Pipeline Removal (OU5) at 3000 Horizon Boulevard approved by EPA.	1/12/2007

Soil Management Plan for Non-Impacted Areas (OU1 and OU2) approved by EPA.	7/5/2007
Remedial Action Construction Start at OU1 and OU2.	4/23/2007
Pennsylvania Department of Environmental Protection (PADEP) Area of Concern (PADEP AOC) and Former WAL Pipeline at Quarry 2 (OU2) Report of Results and Human Health Risk Assessment approved by EPA.	9/17/2007
OU8 and OU9 Remedial Design Work Plan approved by EPA.	9/20/2007
PADEP AOC Report of Results for Additional Remedial Action approved by EPA.	12/17/2007
Remediation Plan for Relocation of Soils From Quarry 1 and Boring 141/203 to Quarry 2 approved by EPA.	1/7/2008
MNA (OU6) Groundwater Pre-Design Investigation Report approved by EPA.	3/19/2008
Remedial Design for Quarries 1 and 2 (OU1 and OU2) approved by EPA.	3/27/2008
Supplemental Pre-Design Work Plan for MNA (OU6) approved by EPA.	4/9/2008
PADEP approves temporary discharge of treated Quarry 3 (OU3) pond water to Matsunk Creek.	6/25/2008
Focused Feasibility Study for surface water treatment and discharge of Quarry 3 (OU3) pond water approved by EPA.	7/24/2008
Report of Results for Boring 141/203 Area of Concern (OU1) approved by EPA.	12/4/2008
Report of Results for Relocation of Soils – Quarry 1 to Quarry 2.	1/23/2009
Remedial Design for Quarry 3 Phase 1 (OU3) approved by EPA.	2/6/2009
Remedial Action Work Plan for Quarry 3 (OU3) Phase 1A; Appendix E (Water Treatment and Discharge) approved by EPA.	2/18/2009
Quarry 3 (OU3) Remedial Action Construction Starts.	2/24/2009
Indoor Air Quality Sampling Plan for Kindercare Learning Center (OU10) approved by EPA.	3/6/2009
Health Risk Assessment for Former Dump Area (Area 6) (OU8) approved by EPA.	3/31/2009
Technical Memoranda for Statistical Analysis of Quarry 3 Soils and Development of Target Naphthalene Concentration in soils approved.	4/6/2009
Quarry 3 (OU3) Phase 1A Remedial Action Work Plan approved by EPA.	4/13/2009
Quarry 3 (OU3) Phase 1B Remedial Action Work Plan approved by EPA.	4/21/2009
EPA issued Explanation of Significant Differences (ESD) revising Quarry 3 naphthalene cleanup standard and changing Quarry 3 surface water disposal from offsite treatment/disposal to onsite treatment with surface water discharge.	4/30/2009
Remedial Design for Quarry 3 (OU3) Phase 2 approved by EPA.	7/21/2009
Remedial Action Work Plan for Quarry 3 (OU3) Phase 2 approved by EPA.	7/21/2009
Health Risk Assessment for Former WAL Pipeline (OU5) approved by EPA.	9/16/2009
Former WAL Pipeline (OU5) Investigation Report approved by EPA.	9/21/2009

Remedial Design and Remedial Action Work Plan for Former WAL Pipeline (OU5) approved by EPA.	10/7/2009
Remedial Action Construction Starts at Former WAL Pipeline (OU5).	10/14/2009
Evaluation of Constituents in Plateau Area Quarry 3 (OU3) Post-Excavation Soils-approved change to RD.	11/6/2009
Remedial Action Construction Completed at Former WAL Pipeline (OU5).	11/19/2009
Lot 7 (OU10) Remedial Design and Remedial Action Plan approved by EPA.	11/24/2009
Remedial Action Construction starts at Lot 7 (OU10).	12/5/2009
Area 6/Lot 44 Former Disposal Area and Southeast Property Area (OU8 and OU9) Remedial Design and Remedial Action Plan approved by EPA.	12/10/2009
Remedial Action Construction started at Area 6/Lot 44 Former Dump Area (OU8).	12/18/2009
Remedial Action Construction starts at Area 6 – Southeast Property Area (OU9)	12/22/2009
Remedial Action Construction completed at Lot 7 (OU10).	1/9/2010
Remedial Action Construction completed at Area 6 – Southeast Property Area (OU9)	1/21/2010
Remedial Action Construction completed at Area 6/Lot 44 Former Dump Area (OU8).	1/22/2010
Post Excavation Risk Evaluation for Soil, Former WAL Pipeline Area (OU5) at Williamsburg Commons property approved by EPA.	3/19/2010
Post Excavation Risk Evaluation for Lot 44 Former Dump Area (Area 6) (OU8) approved by EPA.	6/1/2010
Post Excavation Risk Evaluation for Soil at Southeast Property Area (OU9) approved by EPA.	6/1/2010
Health Risk Assessment for Lot 7 and 2001 Commons Associates L.P. Property and Post-Excavation Risk Assessment for Lot 7 Soil (OU10) approved by EPA.	6/2/2010
Air Quality Report for Kindercare Learning Center (OU10) approved by EPA.	6/3/2010
EPA provides conditional approval of Interim Remedial Design Report for Quarry 4 (OU4) Demonstration Project.	7/22/2010
Remedial Action Report for Former WAL Pipeline (OU5) submitted.	8/10/2010
Monitored Natural Attenuation (OU6) Work Plan approved by EPA.	8/17/2010
Quarry 3 (OU3) Remedial Action Construction completed.	8/19/2010
Quarry 4 (OU4) Demonstration Project Well Drilling starts	8/23/2010
Quarry 4 (OU4) Demonstration Project Sampling starts	9/14/2010
MNA (OU6) sampling starts	11/9/2010
Area 6/Lot 44 Former Dump Area (OU8) Remedial Action Report approved by EPA.	12/14/2010
Area 6/Lot 44 Southeast Property Area (OU9) Remedial Action Report approved by EPA.	12/14/2010
Remedial Action Report for Quarry 3 (OU3) submitted.	12/15/2010
Lot 7 (OU10) Remedial Action Report approved by EPA.	8/2/2011
Construction Completion date.	N/A



### III. Background

#### Physical Characteristics

The Crater Resources Superfund Site (Site) is located in Upper Merion Township, Montgomery County, Pennsylvania. The Site covers 50 acres of partially developed land located approximately one mile south of the King of Prussia section of Upper Merion Township, Montgomery County, Pennsylvania (Attachment 1). Portions of the Site are currently being developed by private entities. The Site consists of several subdivided parcels, now owned individually by Crater Resources, Inc., Each Parcel As Is, Inc., Out Parcel, Inc., Liberty Property Limited Partnership and Liberty Property Trust (Liberty), Renaissance Land Associates (RLA), RAGM Settlement Corporation, and the Gulph Mills Golf Club. Four former quarries (Quarries 1, 2, 3, and 4) are located on the Site and cover approximately 14 acres. In addition, a small area, known as Area 6 is on the Site. Area 6, which was also known as Lot 44, is located on a parcel east of Quarry 4 and south-southwest of Renaissance Boulevard. This area contained two separate disposal areas identified as the Former Dump Area (FDA) and Southeast Property Area (SPA). During RD planning, it was determined that each area would be addressed separately with the FDA designated OU8 and the SPA designated OU9. As part of the PDI activities at Area 6, the Group investigated Lot 7, the parcel on the northern side of Renaissance Boulevard extending north-northwest from Swedeland Road for approximately 1,100 feet. Investigation at Lot 7 showed an area of contamination in a section of the parcel across Renaissance Boulevard from the SPA. Portions of the former pipeline which carried the Waste Ammonia Liquor (WAL) from the former Alan Wood Steel facility to the Site are also in existence. Contamination has been found in the soil, groundwater, and sediment in and beneath Quarries 1, 2, 3, and 4 and Area 6. In addition, contamination has been found in the soils along the route of the former WAL pipeline.

The predominant groundwater flow direction in the Site vicinity is to the east/northeast toward the Schuylkill River, which is parallel to bedrock strike. However, groundwater in the vicinity of the Site may also have a smaller, northeast component of flow, due to the presence of north/northeast-trending bedrock fractures, and large volume pumping to the north.

An average of 10 million gallons per day of groundwater is pumped from the Upper Merion Reservoir (UMR). In addition, groundwater is also pumped from the McCoy Quarry, which is located approximately one mile northeast of the Site. Previous studies considered the effects of pumping at the UMR and McCoy Quarry and concluded that the combined pumping at the two locations has created overlapping elongate cones of depression oriented approximately N60E parallel to bedrock strike. As a result of this cone of depression, hydraulic gradients are steeper in the north-south direction than east-west. This suggests high transmissivity and high flow rates along strike, and low transmissivity and low flow rates perpendicular to strike. The Site does not appear to be within the capture zone of the UMR or the McCoy Quarry. The areal extent of site contaminants will continue to be monitored.

## **Land and Resource Use**

The Site is located on several subdivided parcels, now owned individually by Crater Resources, Inc., Each Parcel As Is, Inc., Out Parcel, Inc., Liberty, RLA, RAGM Settlement Corporation, and Gulph Mills Golf Club. Attachment 2 is a figure which shows the current property owners in relation to the Site.

Site development by Liberty has already been completed and more development is anticipated on the remaining parcels. In addition, RLA has already constructed one office building and is contemplating the construction of additional office buildings.

The lands owned by Crater Resources, Inc., Each Parcel As Is, Inc., Out Parcel, Inc., Liberty, RLA, and RAGM Settlement Corporation all fall within Renaissance Park (a commercial office park) and are subject to perpetual deed restrictions which limit the use of the lands to commercial and light industrial use. Residential use would only be permitted if (1) an owner of at least 20 contiguous acres sought to develop a mixed-use development, and (2) Swedeland Road Corporation specifically approved such a use. The lands that might qualify for a special application for residential use are now under construction for nonresidential, commercial uses. The remaining property owner, Gulph Mills Golf Club, has agreed in principle to covenants that prevent residential development or potable water well installation on the affected portion of its property; these covenants are presently awaiting finalization.

The RI has determined that there is no private well water use for potable supply within the area potentially affected by the Site. Furthermore, Upper Merion Township requires that all residential, commercial, and industrial potable water users connect to public water if there is a public water main on their street. Water wells for non-potable use are permitted. Surface water drainage in the Site vicinity is generally eastward towards the Schuylkill River, which is a mile east of the Site. Matsunk Creek drains the area southeast of the Site, and discharges to the Schuylkill River. The UMR is located within a mile of the Site.

## **History of Contamination**

From 1918 until 1977, Alan Wood and its successors operated a coke and coke byproduct manufacturing facility in nearby Swedeland, Pennsylvania. The facility was located on the west side of the Schuylkill River, approximately one mile northeast of the Site. After Alan Wood declared bankruptcy in 1977, the facility and property were first leased and subsequently sold to Keystone Coke. Keystone Coke produced and sold coke at the facility from 1978 until the spring of 1981, when all operations at the facility ceased.

The coking process typically generated coal gas, light oils, tars containing phenolic compounds, naphthalene (resulting from the destructive distillation of coal), ammonia, and WAL wastewater. WAL was pumped via pipeline from the Alan Wood facility to Quarries 1, 2, and 3, and remnants of the pipeline were still visible near the western edge of Quarry 3. The RI found no evidence that Quarry 4 was used directly for WAL disposal, but it may have received impacted water as a result of overflows from Quarry 3 and releases from the WAL pipeline.

The PADOH initiated an environmental investigation on January 6, 1969 that was carried through by the PADER which lasted throughout the 1970s. PADER, now the Pennsylvania Department of Environmental Protection (PADEP), asserted into the early 1980s that the use of the quarries was adversely affecting local groundwater. In March 1969, PADOH estimated the levels of phenol in the 43,000 gallons per day of waste being discharged into Quarry 3 at 1,888 parts per million. The sampling documented elevated levels of cyanide, ammonia, and phenol in the WAL discharge and in groundwater in the area. Quarries 1 and 2 were filled in with demolition waste sometime after 1969.

In 1975, Alan Wood installed a prototype treatment plant to treat its industrial wastes and discharge them to the Schuylkill River. However, PADER found that the levels of phenol and cyanides in the plant's effluent exceeded the levels specified in the PADER-issued National Pollutant Discharge Elimination System (NPDES) permit. On November 26, 1975, Alan Wood signed a Consent Order with PADER, in which Alan Wood agreed to achieve specified effluent limitations for the phenol and cyanides in its discharges before October 31, 1979. Until those limitations were met, Alan Wood was allowed to continue to discharge its effluents to Quarry 3. After Alan Wood filed for bankruptcy, discharges to Quarry 3 ceased until Keystone Coke signed a Consent Order with PADER on April 24, 1978, and thereafter reactivated the plant.

During 1977-1979, PADER sampled the WAL discharges to Quarry 3, groundwater discharges at neighboring quarries in the region and area wells. PADER reported that sampling showed elevated levels of cyanide, ammonia, and phenol in the WAL discharge and in groundwater in the area during that period of time. In addition, on February 25, 1980, PADER determined that numerous violations of the interim effluent limits had occurred.

On May 16, 1979, EPA conducted a Groundwater Monitoring Survey which involved sampling of Quarry 3 and the surrounding area and included an investigation of possible sources of contamination threatening the UMR, a public drinking water source located about one mile to the northwest of the Site and operated by the Philadelphia Suburban Water Company. While conducting sampling at the Site, EPA found phenolic compounds, chlorides, naphthalene, and other organic contaminants in Quarry 3. EPA conducted additional sampling at the Site on May 25, 1979.

On April 8, 1983, EPA conducted a PA of the Site, followed by a SI on May 9, 1983, during which samples were obtained from Quarry 3 and from three of the monitoring wells that had been installed in 1982 by PADEP in the vicinity of Quarry 3. The PA and SI revealed that hazardous substances were present in Quarry 3 including benzene, toluene, naphthalene, cyanide, zinc, arsenic, lead, phenolic compounds and polynuclear aromatic hydrocarbons (PAHs). Analysis of groundwater in the vicinity of the Site, taken from the monitoring wells, showed the presence of benzene and metals including arsenic, cyanide, lead, mercury, zinc, beryllium, nickel, cadmium, and selenium.

In June 1990, EPA took additional samples at the Site. Samples were collected from waste and soil in Quarry 3, ponded water near the quarry, borings of fill material taken from an area

believed to be Quarry 1, off-site monitoring and private wells, and the UMR. Waste in Quarry 3 contained elevated levels of various contaminants including cyanide, arsenic, benzene, lead, zinc, and PAHs.

The Site was proposed for listing on the National Oil and Hazardous Substances Pollution Contingency Plan NPL of uncontrolled hazardous substances releases pursuant to CERCLA Section 105, 42 U.S.C. § 9605, in February 1992. The Site was listed on the NPL on October 14, 1992.

On September 17, 1994, Beazer East, Inc., Keystone Coke Company, Inc., and Vesper Corporation (Crater PRP Group) entered into an Administrative Order on Consent (AOC) with EPA under CERCLA Sections 104 and 122, 42 U.S.C. §§ 9604 and 9622. Under the AOC, the Crater PRP Group agreed to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Site to determine the nature and extent of the contamination at or from the Site, and to evaluate alternatives for remedial action to prevent, mitigate or otherwise respond to or remedy the release or threatened release of hazardous substances; pollutants, or contaminants at or from the Site.

The RI field work was completed in January 1999 and the RI Report was approved by EPA on June 23, 1999. After completion of the RI, the Crater PRP Group commenced the FS to evaluate various remedial alternatives to address the nature and extent of contamination identified in the RI.

In December 1999, EPA completed a Human Health Risk Assessment (HHRA), which is documented in the Final Baseline Risk Assessment Report, to evaluate the human health risks that could result if no remedial action were taken at the Site. The Final Baseline Risk Assessment Report and RI Report are available for review in the Administrative Record for the Site. The human health risks associated with the Site are discussed in the "Summary of Site Risks" Section of the Record of Decision.

On February 29, 2000, a draft FS report was submitted to EPA by the Crater PRP Group. On April 20, 2000, pursuant to Section IX.A.(3) (Submissions Requiring Agency Approval) of the AOC, EPA notified the Crater PRP Group of its intention to modify and subsequently approve the Draft FS Report. EPA reviewed the Draft FS report and completed an Addendum to the FS Report on June 16, 2000.

### **Basis for Taking Action**

Soils and sediments in the quarries and soils impacted by releases from the WAL pipeline were contaminated by discharges of WAL. The contamination associated with the soils may be transported by various mechanisms and exposure routes to human and biotic receptors.

Future residents, current and future trespassers, and future industrial and construction workers may be subject to exposure to contaminants in soil via direct contact. Potential exposures are via ingestion and/or dermal contact. Should contaminants become airborne either

by wind erosion or construction activities, inhalation becomes a potential exposure route. Terrestrial biota are also subject to exposure via dermal exposure and ingestion of contaminated soils as well as via inhalation of airborne materials.

Groundwater has also been impacted at the Site by infiltration/percolation of contaminants from the soil into the aquifer. Potential exposure scenarios include future residents and industrial workers via ingestion, dermal contact, and, in the case of Volatile Organic Compounds (VOCs), via inhalation.

## **IV. Remedial Actions**

### **Remedy Selection**

Based on the findings presented in the RI/FS, EPA Region III issued a ROD for this Site on September 27, 2000. The selected remedial action includes the following major components:

1) Removal of all contaminated soils and sediment in Quarry 3: Ponds 1, 2, and 3, which are located within Quarry 3, will be dewatered and the water will be transported to an off-site disposal facility. The sediments at the bottom of the ponds will be excavated down to the bedrock layer or to the level where contaminant concentrations in the sediments are at levels protective of groundwater, human health or ecological risk-based concentrations, dewatered, and taken off-site for proper disposal or recycling. The Quarry 3 plateau area will be excavated down to the bedrock layer or to the level where the contaminant concentrations in the soils are at human health or ecological risk-based concentrations, and the soil taken off-site for proper disposal or recycling. All remaining soil areas in Quarry 3 with contaminant levels above human health or ecological risk-based concentrations will be removed and taken off-site for proper disposal or recycling. The excavated areas will then be filled with clean soil to establish a uniform grade, and graded for proper drainage.

2) Construction of a cap to prevent infiltration of surface water into the contaminated soils of Quarries 1, 2 and 4 and other contaminated soil areas: A multi-media cap consisting of a series of low-permeability clays, geotextile liners, sand drainage layers, and soil or other appropriate covers will be installed to prevent unacceptable leaching of contaminants from the soils and sediment into the groundwater. The cap will be constructed in accordance with the Commonwealth's Residual Waste Management Regulations, for final cover of Class 1 residual waste landfills, set forth at 25 Pa. Code Sections 288.234 and 288.236-237. The Responsiveness Summary in the ROD addresses flexibility in determining remedial actions for areas where further evaluation was required (i.e., other contaminated soil areas) during the RD to allow for land development considerations. EPA agreed that flexibility should be incorporated into the RD process provided ARARs and ROD performance standards are met and RA activities are completed in a timely manner. The Responsiveness Summary also indicates that the evaluation of other contaminated areas; (i.e., Area 6 which consists of OU8, OU9, and OU10) will be conducted to determine whether cleanup standards have been met at areas where removal actions have been conducted and whether a cap is required.

3) Monitored Natural Attenuation (MNA) of the groundwater: Groundwater monitoring will be conducted at on-site and off-site locations, in order to sample for selected Site-related Semi-Volatile Organic Compounds (SVOCs), metals, cyanide, and VOCs that presently exceed preliminary remediation goals. Additional parameters representative of the natural attenuation process will also be included in the monitoring program. This monitoring will provide a basis to determine the rate at which natural attenuation is taking place. EPA has determined that this rate needs to be sufficient to attain the remedial goals within a fifteen (15) year time period. If, during the fifteen (15) year time period, it is evident that the rate of natural attenuation is not sufficient to attain such goals in the fifteen (15) year time frame, EPA will then seek to implement the contingent groundwater remedy, which is described in the "Selected Remedy and Performance Standards" Section of the ROD.

The contingent groundwater remedy calls for groundwater recovery and treatment from the center of the groundwater plume at the Site. The purpose is to extract and treat the most highly contaminated groundwater from beneath the Site. The recovery system would pump the water near the downgradient edges of Quarries 2 and 3 using a line of recovery wells spread across the width of the plume. The groundwater would then be pumped to an on-site treatment facility to remove contaminants to specified treatment levels and the treated water would be discharged to the Schuylkill River or Matsunk Creek.

4) Further investigation of the former WAL pipeline: The pipeline runs from the former Alan Wood Steel facility to Quarries 1, 2, and 3 located on the Site. Some sections of the pipeline have been removed by the Crater PRP Group and other private parties during development activities. However, the entire route of the former WAL pipeline will be fully investigated and characterized where there has not been a previous action taken, to determine the existence of any contamination along the route. Any pipeline investigation and clean-up actions which have been conducted in accordance with EPA accepted risk driven clean-up levels are described in Section II of the ROD. Any pipeline soil areas with contaminant levels above human health or ecological risk-based concentrations will be removed and taken off-site for proper disposal or recycling. In addition, any hardened tar material from past WAL pipeline leaks will be excavated and transported to an off-site disposal facility.

5) Institutional Controls: ICs will be implemented to restrict on-site soil, sediment, surface water and groundwater use and/or disturbance at the Site, except as required for implementation of the remedy, in order to reduce the potential for human exposure to contamination. ICs (e.g., easements and covenants, title notices and land use restrictions through orders from or agreements with EPA) would be established in order to prevent any disturbance of the cap once installed, as well as to preclude the installation of any potable wells in the contaminated aquifer.

## **Remedy Implementation**

The Site consists of ten OUs. Table 2 provides the definition, Remedial Action Objectives (RAO), and status of each OU.

**Table 2: Site Operable Units**

<b>Operable Unit</b>	<b>Remedial Action Objectives</b>	<b>Current Status</b>
OU1 – Quarry 1	Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Remedial Design complete. Remedial Action underway. Soil cut/fill complete and temporary cover installed. All contaminated materials placed under temporary cap.
OU2 – Quarry 2	Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Remedial Design complete. Remedial Action underway. Soil cut/fill complete and temporary cover installed. All contaminated materials placed under temporary cap.
OU3 – Quarry 3	Eliminating exposure to soil/sediment which presents an unacceptable risk to human health. Limiting exposure of ecological receptors to affected surface water in the Quarry 3 pond water.	Remedial Action Complete
OU4 – Quarry 4	Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Demonstration project underway to evaluate the need to cap Quarry 4.
OU5 – WAL Pipeline	Eliminating exposure to soil/sediment which presents an unacceptable risk to human health.	Remedial Action Complete
OU6 – Groundwater MNA	Restoring groundwater to its beneficial use (as drinking water)	MNA monitoring underway
OU7 – Cinder/Slag Fill Area	Eliminating exposure to soil/sediment which presents an unacceptable risk to human health.	Remedial Action Complete
OU8 – Area 6	Eliminating exposure to soil which presents an unacceptable risk to human health. Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Remedial Action Complete
OU9 – Southeast Property Area	Eliminating exposure to soil which presents an unacceptable risk to human health. Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Remedial Action Complete
OU10 – Lot 7	Eliminating exposure to soil which presents an unacceptable risk to human health. Preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination.	Remedial Action Complete

Three of the OUs listed above were more fully characterized after the issuance of the ROD for the Site. As part of Liberty's due diligence survey prior to purchasing the parcel for development, an area of fill material was identified in the north-central portion of their 2301 Renaissance Boulevard property. This fill area was designated the Cinder/Slag Fill Area (CSFA). Based on the results of these previous site characterization activities, the material in the CSFA was determined to consist primarily of glass, ash, coal dust, cinders, and slag, and encompassed an area 250 feet long by 150 feet wide. As part of Liberty's due diligence survey of Lot 44 (which was not purchased by Liberty), an area of fill material was identified located south of OU8 (Area 6). This area was divided into OU9 (Southeast Property Area) and OU10 (Lot 7). The fill was determined to consist primarily of ash, coal dust, cinders, and slag.

EPA sent Special Notice Letters on November 17, 2000 to the Respondents requesting that they enter into another Consent Decree pursuant to which they would agree to perform the RD/RA called for in the ROD. EPA subsequently issued an Administrative Order for Remedial Design and Remedial Action, (Unilateral Order or UAO) Docket No. 3-2001-0009, on April 30, 2001 to nine Potentially Responsible Parties (PRPs). Those nine PRPs agreed to comply with the UAO, by letter dated June 1, 2001, and undertook performance of the UAO obligations. The following sections provide a summary of the remedial actions which have been implemented at the Site.

#### Operable Unit 1 – Quarry 1

The ROD specifies that a multi-media cap consisting of a series of low-permeability clays, geotextile liners, sand drainage layers, and soil or other appropriate covers to prevent unacceptable leaching of contaminants from the soils and sediment into the groundwater shall be constructed at Quarry 1. The cap will be constructed in accordance with the Commonwealth's Residual Waste Management Regulations, for final cover of Class 1 residual waste landfills, set forth at 25 Pa. Code Sections 288.234 and 288.236-237.

O'Neill Properties LLP (O'Neill) is in the process of developing the parcels adjacent to and including Quarry 1. O'Neill has completed development of the 2701 Renaissance Boulevard office building located on a parcel between Quarries 1 and 2. The 2901 Renaissance Boulevard office building is planned to be constructed adjacent to the northwestern corner of Quarry 1. Infrastructure, including parking areas and walkways are planned to be constructed on Quarry 1 after completion of the RA for this OU. OU1 includes Quarry 1 and areas outside Quarry 1 impacted by WAL. These areas, identified during various stages of site development and investigations, include the western side of Quarry 1, the Boring 141/203 Area of Concern located on the eastern side of Quarry 1, the Golf Course Area of Concern located on the southern side of the quarry, and the Upper Retention Basin. These areas will be discussed individually below.

A Pre-Design Investigation Work Plan for Quarries 1 and 2 was submitted by O'Neill and approved by EPA on July 3, 2001. The PDI included a geophysical study and soil boring program to determine the limits of each quarry. The results were presented in a PDI report



approved by EPA on December 3, 2001. A geotechnical investigation was performed from December 2003 through January 2004 to acquire data applicable to the cap design at Quarries 1 and 2. O'Neill submitted a RD work plan for capping Quarries 1 and 2 which was approved by EPA on May 24, 2005.

O'Neill commenced work on the RD, submitting 30%, 90%, and 100% RDs; the 100% RD was approved by EPA on March 27, 2008. The design included remediation of the impacted soils outside the Quarry limits, consolidation of materials in Quarry 1 to Quarry 2, and capping of the quarries in accordance with PADEP Residual Waste Management Regulations for Class 1 Landfills set forth in PA Code Sections 288.234 and 288.236-237. The design included a flexible membrane hydraulic barrier layer with an overlying drainage composite layer.

RA activities were planned to coordinate with O'Neill's Land Development Plan (LDP) approved by Upper Merion Township (UMT) for the property. The development required cutting the elevation of Quarry 1. As this phase of the development was to proceed prior to cap construction, O'Neill submitted a document titled "Remediation Plan for Relocation of Soils From Quarry 1 and Boring 141/203 to Quarry 2" which was approved by EPA on January 8, 2007. This plan provided details on clearing vegetation from the quarries; excavation, loading, and transport of materials from Quarry 1 to Quarry 2 including a pedestrian and traffic control plan; placement and compaction of materials in Quarry 2; surface water management; and construction of a temporary cover on both quarries.

As part of the land development, EPA required O'Neill to provide a contingency plan if WAL or impacted soils was encountered during conventional construction activities. O'Neill submitted a "Soil Management Plan for Non-Impacted Areas", which was approved by EPA on July 5, 2007. This plan included the contingency that all work would stop if an impacted area was encountered and included provisions for excavation and relocation of the materials to Quarry 2 and post-excavation sampling. Further development of the area would not proceed until performance standards were met.

The LDP called for two retention basins to be constructed at the O'Neill parcels. The lower basin is located east of Quarry 3 and the upper basin is located adjacent to the southwestern corner of Quarry 1. A soils investigation was performed at the basins and other potentially impacted areas outside the quarry limits in 2006 in accordance with the "Revised Retention Basin Sampling and Analysis Plan" approved by EPA on January 11, 2005. Results from the investigation at the basins showed no unacceptable risks for any exposure scenarios at the lower basin; however, arsenic results at two sample locations taken from the upper basin were above PADEP Non-Regulated Clean Fill standards. EPA and PADEP agreed that these soils could be placed at the building pad for the 2901 Renaissance Boulevard building to be constructed which would mitigate the potential for surface water runoff to contact these materials for transfer to surface water or groundwater. Remediation of these locations in the upper basin was conducted in accordance with the "Soil Management Plan for Non-Impacted Areas – Crater Resources Superfund Site" approved by EPA on July 5, 2007. Excavation of impacted soils at the upper basin and relocation and compaction of these soils at the 2901 Renaissance Boulevard

building pad was performed in April 2008. Approximately 1,175 cubic yards of impacted soil were relocated. These materials were placed approximately 5 feet below the top of the final grade of the pad. These activities were documented in a letter report of results on August 29, 2008.

The boring 141/203 area includes the area adjacent to the eastern side of Quarry 1, part of which was designed as the Quarry 1 cap buffer zone, and extends eastward to a portion under the parking lot for the building at 2701 Renaissance Boulevard. Subsurface investigations of this area were performed in 2006 and 2007 and included soil borings which showed the presence of WAL in several locations. O'Neill prepared the document titled "Remediation Plan for Relocation of Soils From Quarry 1 and Boring 141/203 Area of Concern to Quarry 2" approved by EPA on January 8, 2008. O'Neill obtained approval from PADEP with EPA's concurrence to permit WAL-impacted materials in the buffer zone to remain as this was to be left under the cap. EPA also approved O'Neill's request to leave impacted soils under the parking lot provided the area was maintained as a paved parking lot. The remediation work plan specified that only WAL-impacted materials either outside the buffer zone, but not under the parking lot, or within the buffer zone that required a cut as per the LDP, were to be removed and placed within Quarry 2. ICs preventing disturbance of areas with contamination left under the cap in the buffer zone or under the parking lot without EPA approval are required.

Excavation of the boring 141/203 Area of Concern was conducted in June and July 2008. WAL and visually impacted soils were removed from the areas outside the buffer zone or requiring a cut for land development purposes inside the buffer zone. The initial excavation was approximately 25 feet wide by 35 feet long and 8 feet deep. Post-excavation samples were collected and two samples showed arsenic and chromium above performance standards. Additional excavation and post-excavation sampling was conducted between the cap and paved area to remove the soils exceeding standards. Sampling indicated that performance standards were achieved and the area was backfilled. A total of approximately 260 cubic yards of impacted soils and WAL was removed from this area. The remedial actions are documented in the "Boring 142/203 Area of Concern- Final Remedial Action Report" approved by EPA on December 4, 2008.

WAL-impacted soils were discovered during conventional construction activities on the western side of Quarry 1 in several areas outside the quarry and the 15-foot buffer zone required in the RD. EPA determined that these areas could be addressed using the remediation plans and standards developed for relocating soils from Quarry 1 and the Boring 141/203 area to Quarry 2. These areas were addressed at various stages of land development as they were encountered. The first areas were visually stained surface soils which were excavated on February 11, 2008. These areas were located approximately 60 feet outside the northwest corner of the quarry and approximately 40 feet west of the quarry, respectively. The first excavation was approximately 94 feet by 17 feet and 1 foot in depth; the second area was approximately 5 feet by 3 feet and 1 foot in depth. Excavated materials were placed in Quarry 1 for later transfer to Quarry 2. Post-excavation samples were collected and several samples showed that SVOCs exceeded performance standards and additional excavation would be required in both areas.

On February 28, 2008, prior to re-excavation of these areas, test pits were dug to determine the visual extent of contamination. On February 28 and 29, 2008, an additional 170 cubic yards of material were removed from these areas and resampled. Results again showed two locations from the bottom of the excavations exceeding SVOC standards. It was agreed that additional excavation would be required. Additional excavation and sampling occurred on March 25, 2008; two samples adjacent to a required cut at the buffer zone exceeded standards; however, this excavation was scheduled, with EPA approval, to coincide with the cut work scheduled for the buffer zone in May 2008.

On April 17, 2008 WAL stained soils from three small areas on the southern side of Quarry 1 were excavated and samples were collected. Two of the samples exceeded the SVOC standards and resulted in additional excavation. This additional work was performed on April 23, 2008 and the post-excavation samples indicated that performance standards were met. On April 29, 2008, three small areas with WAL-stained soils were excavated from the southwestern side of Quarry 1. Post-excavation samples showed one location on the excavation floor exceeding performance standards. Additional excavation from this area was completed on May 5, 2008. All excavated materials were placed in Quarry 1 for later transfer to Quarry 2. Post-excavation samples showed results below standards.

WAL-stained soils and boulders were excavated from an area on the southwest corner of the quarry on May 13 and 14, 2008. Post-excavation samples showed levels above performance standards for chromium and arsenic. On May 22, 2008, additional excavation in this area was conducted; post-excavation samples showed that performance standards were met. Excavated materials were placed in Quarry 1 for later transfer to Quarry 2. Results of the excavation and confirmation sampling were presented in the "Report of Results for WAL Removal –Outside of Quarry 1" dated August 2008.

The Golf Course Area of Concern was identified during grading for land development of the area south of the quarry. This area was observed to be a deposit of WAL-impacted materials around a tree growing along the property line of the O'Neill parcel and Gulph Mills Golf Club. Similar to the WAL-impacted soils discovered west of the quarry, EPA determined that the Golf Course AOC could be addressed using the remediation plans and standards developed for relocating soils from Quarry 1 and the Boring 141/203 area to Quarry 2. Initially, on April 17, 2008, O'Neill removed visually impacted materials from around the tree on their portion of the property and collected post-excavation samples. As additional land clearing for conventional construction occurred in the area, more impacted soils were observed. O'Neill, the Group, and Gulph Mills Golf Club reached an agreement for O'Neill to access the golf course property to remove the tree where WAL was initially observed and perform removal of WAL impacted soils.

In May 2008, the tree, root ball, and visually impacted soil were removed and placed in Quarry 1 for later transfer to Quarry 2. Post-excavation samples indicated that SVOCs and chromium remained at concentrations above performance standards; therefore, additional

excavation was required. On July 14, 2008, additional soils were excavated and post-excavation samples were collected. Results showed remaining soils met performance standards and no additional excavation in the area was required. A description of the remedial actions and results were presented in the document titled "Report of Results – Golf Course Area of Concern" submitted in September 2008.

The transfer of materials from Quarry 1 to Quarry 2 occurred between May 2008 and July 2008. After clearing of both quarries and preparation of Quarry 2 to accept new materials, Quarry 1 was cut to the elevation specified in the LDP. A total of 1,593 truck loads (estimated 17,523 cubic yards) of material from Quarry 1 were transferred to Quarry 2 where it was placed and compacted. After relocation of materials from Quarry 1 was completed, a temporary cover was placed on the quarry and a 15-foot buffer zone outside the quarry limits. The temporary cover consisted of 16-ounce non-woven geotextile fabric placed directly on the prepared quarry subgrade. The fabric was covered with a minimum 8-inch continuous layer of 2A stone. A fence was erected around the quarry to restrict access. O'Neill submitted a document on January 23, 2009 titled "Report of Results for Relocation of Soils – Quarry 1 to Quarry 2" providing a description of these activities.

#### Operable Unit 2 – Quarry 2

The ROD specifies that a multi-media cap consisting of a series of low-permeability clays, geotextile liners, sand drainage layers, and soil or other appropriate covers to prevent unacceptable leaching of contaminants from the soils and sediment into the groundwater shall be constructed at Quarry 2. The cap will be constructed in accordance with the Commonwealth's Residual Waste Management Regulations, for final cover of Class 1 residual waste landfills, set forth at 25 Pa. Code Sections 288.234 and 288.236-237.

O'Neill is in the process of developing the parcels adjacent to and including Quarry 2. The 2501 Renaissance Boulevard office building is planned to be located adjacent to the western end of Quarry 2 (and east of the 2701 building). Infrastructure, including parking areas and walkways are planned to be constructed on Quarry 2 after completion of the RA for this OU. OU2 includes Quarry 2 and areas outside the quarry impacted by WAL. These areas include the PADEP Area of Concern, located to the north and northwest of the quarry. A section of the remnants of the former WAL pipeline was also located adjacent to Quarry 2. Impacted soils and the pipeline remnants were placed in Quarry 2; however, details of the RD and RA activities for the pipeline are presented in the OU5 narrative.

Quarry 2 RD activities and the transfer of Quarry 1 soils to Quarry 2 are detailed in the OU1 narrative. The area north and northwest of the quarry outside the cap limits specified in the OU1/OU2 RD is referred to as the PADEP AOC. O'Neill reached agreement with EPA that the cap would not be extended over this area and O'Neill would investigate, delineate, and remediate impacted soils for comparison to the ROD's performance standards or perform a risk assessment to justify that no adverse risk to human health or leaching to groundwater would occur.

In August 2005, investigation of the PADEP AOC was performed to delineate the extent of WAL-impacted soils in the area. This area was identified by PADEP personnel who observed deposits of WAL on the ground surface. A series of test pits/trenches were dug in the area. A total of 13 trenches were excavated to lengths from approximately 35 feet to 165 feet and to depths of 3 to 10 feet below ground surface. The length and depth of the excavations were based on observations of WAL material, stained soils, or elevated photoionization detector (PID) readings in the trench and continued until evidence of contamination was no longer present. Approximately 345 cubic yards of material was excavated and placed in Quarry 2 for later compaction and placement under the cap. Samples were then collected at intervals along the sidewalls, headwalls, and floor of each trench. Sample results showed exceedances of soil standards for SVOCs. A risk assessment was performed, and based on the sample results, it was estimated that additional remediation of 285 cubic yards of impacted soils was required. The results of the investigation and risk assessment were approved by EPA on December 19, 2006.

O'Neill prepared a remediation plan for the additional soil removal which EPA approved on March 15, 2007. The proposed area of additional excavation was approximately 85 by 10 feet wide and 10 feet deep and included a provision to continue excavation until no visual or olfactory evidence of contamination was present. Excavation commenced on April 23, 2007. The excavation area increased in size to approximately 120 feet by 25 feet by 10 feet in depth due to the observation of contamination. The excavation was halted on the western side when it approached the embankment for a storm water retention basin to prevent undermining of the basin. It was decided that post-excavation samples would be collected at this point as well as the other headwalls, sidewalls, and floor of the excavation. Three of the eight samples collected showed SVOCs above site-specific screening levels and a risk assessment was prepared. The risk assessment indicated that there was no adverse risk to a future industrial worker; however, the potential for naphthalene to leach to groundwater had not been mitigated by the remediation. The risk assessment indicated the proposed LDP included an asphalt parking lot over the soils containing elevated naphthalene which would mitigate infiltration and leaching of contamination to groundwater. EPA approved the report of results and risk assessment on September 17, 2007.

In September 2007, additional WAL-impacted soils were uncovered on the surface during land development construction activities at a location approximately 50 feet from the southwestern corner of the PADEP AOC. Action was taken in accordance with procedures detailed in the contingency plan in the soil management plan for non-impacted soils. In October 2007, a 30 by 25 foot wide area was excavated to a depth of 1 foot to remove the surface contamination and the material was placed in Quarry 2. Post-excavation samples showed that chromium exceeded performance standards on a section of the floor of the excavation and additional excavation was required. Approximately one additional foot of soil was removed from a 20 by 20 foot area of the initial excavation on November 5, 2007 and placed in Quarry 2. Post-excavation samples were collected and results met performance standards. Results are documented in the "Letter Report of Results – Additional Remedial Actions at PADEP AOC West Side of Quarry 2" approved by EPA on December 17, 2007.

During relocation of materials from Quarry 1 to Quarry 2, the stockpiles of materials from the PADEP AOC and WAL Pipeline section on the O'Neill parcel that were placed in Quarry 2 were placed in lifts and compacted along with the soils cut from Quarry 1. Density and moisture testing were performed to assure proper compaction for future cap construction. A temporary cover was placed on the quarry and a 15-foot buffer zone outside the quarry limits. The temporary cover consisted of 16-ounce non-woven geotextile fabric placed directly on the prepared quarry subgrade. The fabric was covered with a minimum 8-inch continuous layer of 2A stone. The quarry is enclosed by fencing to restrict access. O'Neill submitted a document on January 23, 2009 titled "Report of Results for Relocation of Soils – Quarry 1 to Quarry 2" providing a description of these activities.

### Operable Unit 3 – Quarry 3

Quarry 3 is located south of the 2501 Renaissance Boulevard parcel which is also occupied by Quarry 2. Quarry 3 is approximately 480 feet south of Renaissance Boulevard and bordered to the south by Gulph Mills Golf Club. Quarry 3 is approximately 7.6 acres, which prior to start of the RA, was heavily vegetated. The quarry contained three ponds with contaminated sediments, a sediment/sludge disposal area on the western side referred to as the plateau area, and contaminated soils in other areas of the quarry.

The ROD called for removal of all contaminated soils and sediment in Quarry 3 including dewatering of the ponds with the water transported to an off-site treatment and disposal facility. Sediment in the ponds and plateau area were to be excavated to bedrock or to the level where contaminant concentrations are at levels protective of human health and ecological risk-based concentrations. Contaminated soils outside the ponds and plateau area (identified as peripheral soils) were to be excavated until contaminant concentrations are at levels protective of human health and ecological risk-based concentrations. All excavated soils and sediment were to be taken off-site for proper disposal. The ROD also called for the site to be backfilled to a uniform grade for proper drainage.

During pre-design planning, the PRP Group proposed to EPA the construction of an on-site water treatment system with discharge of treated pond water to Matsunk Creek in lieu of containerizing and shipping pond water to an off-site location. A focused feasibility study (FFS) to evaluate this proposed alternative was submitted on May 23, 2008. On June 25, 2008, PADEP approved the concept of on-site treatment with discharge to the creek. EPA approved the FFS on July 24, 2008.

The PRP Group and EPA also discussed evaluation of soil cleanup goals. The Group submitted a "Technical Memorandum for the Statistical Analysis of Quarry 3 Soils" and a "Technical Memorandum for Development of Target Naphthalene Concentrations in Quarry 3" which were approved by EPA on April 6, 2009. The first memorandum presented a statistical analysis to determine when soil performance standards were met and the second provided modeling to develop an alternate naphthalene standard that would be protective of human health, the environment, and prevent leaching to groundwater.

On April 30, 2009, EPA issued an Explanation of Significant Differences (ESD) to revise the naphthalene performance standard and allow on-site treatment of pond water with discharge to Matsunk Creek.

The RD was divided into two separate phases. The Phase 1 RD, addressing pond dewatering and treatment and excavation and disposal of pond sediment, was approved by EPA on February 6, 2009. During RAWP planning, Phase 1 was divided further. Phase 1A included mobilization and construction of support areas, water treatment system construction, and pond dewatering. Phase 1B included excavation of pond sediments, stabilization of pond sediment, offsite transportation and disposal of pond sediment, and backfill of ponds. The Phase 1A RAWP was approved by EPA on April 13, 2009 and the Phase 1B RAWP was approved by EPA on April 21, 2009. The Phase 2 RD and RAWP, addressing removal and disposal of plateau area sediment/sludge and impacted peripheral soils and backfilling, grading, and restoration of the quarry, were approved by EPA on July 21, 2009.

The remediation commenced on February 24, 2009 with mobilization of equipment, preparation of support zones and staging areas, site improvements for security and access, clearing, and establishment of haul roads followed by construction of the on-site water treatment system. The water treatment system included solids removal and treatment using granular activated carbon and ion exchange. Pond water was also pre-treated with aeration and caustic injection to control pH and alum to aid settling of solids. Initial trials of the treatment system were conducted where treated water was discharged back into the ponds. Samples were collected to assure that treated water met PADEP temporary permit discharge limits. Upon confirmation that the system met performance standards, pond dewatering commenced on April 20, 2009. The plant typically operated on a 24-hour per day basis with the effluent sent via five-inch pipe approximately 2,000 feet to the discharge point at Matsunk Creek. A total of 2,293,913 gallons of treated water was discharged to the creek through May 15, 2009. At that time, sample results indicated that discharge limits were exceeded for phenanthrene, benzo(a)anthracene, ammonia, and mercury; therefore, the plant was shut down and additional treatment process options were evaluated. Sufficient water had been removed from Pond 3 during the initial operation of the system to allow conditioning and excavation of sediments to proceed.

On April 27, 2009, excavation and stabilization of sediments from Pond 3 began. Sediment was too wet for transportation and disposal and required conditioning/stabilization prior to shipment. Sediments from all ponds were stabilized using either lime kiln dust, pelletized lime, shredded corn cobs, or, during later stages of the work, mixed with peripheral soils. Stabilization agents were mixed in-situ and tested using the paint filter test to confirm materials were suitable for transportation. Excavation of Pond 3 sediments continued through June 2009 until bedrock was encountered on the bottom and north, west, and east sidewalls. The southern sidewall was excavated until no visually impacted soils were observed and post-excavation samples were collected. Sample results were evaluated and EPA agreed on July 11, 2009 that

performance standards were attained. A total of approximately 11,293 tons of sediment (including 272 tons of lime) were removed and disposed off site.

In July 2009 the Group contacted UMT Public Works Department to request a discharge permit for treated water to the sanitary sewer as a substitute for discharge to Matsunk Creek. UMT issued an Industrial Waste Discharge Permit on July 23, 2009. The treatment system was restarted and discharge to the sanitary sewer commenced on July 28, 2009 and ran on and off throughout the remainder of the project. A total of 1,972,172 gallons of treated water was discharged to the sewer.

Excavation of the Plateau Area began on July 23, 2009 and continued through August 21, 2009 when the first round of post-excavation samples were collected at various locations and depths throughout the area. The Group and EPA discussed results and determined that additional excavation in several areas was required. Proposed excavation areas and depths and a request to compare arsenic results to background levels vs. a statistical evaluation was presented by the Group in a letter report dated October 15, 2009 and approved by EPA on November 6, 2009. Excavation and sampling activities continued from October 22, 2009 through December 5, 2009 until performance standards were achieved. A total of 19,539 tons of excavated material from the Plateau Area was disposed off-site.

Excavation, stabilization, and transport and disposal of Pond 1 sediments occurred from August 22, 2009 through November 17, 2009. Bedrock was exposed on the bottom, south, west, and east walls; however, some visually non-impacted soil was left in place on the northern side. These soils were sampled with additional excavation occurring until remaining soils met performance standards. Approximately 29,880 tons of sediment including 540 tons of stabilization agents were removed and disposed off-site.

Pond 2 sediments were excavated, stabilized and disposed from November 19, 2009 through December 4, 2009. The excavation exposed bedrock on all but the west sidewall and a portion of the northwest and southwest walls. These areas were sampled and re-excavated until post-excavation samples showed performance standards had been met or the limits of the peripheral soil excavation area were encountered. A total of 5,570 tons of sediment including 24 tons of lime were excavated and transported off-site for disposal.

Peripheral soils were excavated intermittently from August 25, 2009 to February 23, 2010. Excavation was primarily from five areas of impacted soils between the ponds and the eastern end of the quarry. Excavation continued in each area until post-excavation sample results showed performance standards were achieved. A total of 21,097 tons of peripheral soils were excavated and disposed off-site.

Backfill operations occurred from July 13, 2009 through March 10, 2010 as ponds and other excavation areas met performance standards. Clean fill was sampled to determine suitability for use and had to pass PADEP Clean Fill Standards and Quarry 3 performance standards. Fill was placed in lifts, compacted with a vibratory roller, and density tested to meet



project specifications. The site was graded to allow drainage as per project specifications. A total of 120,300 tons of imported backfill was placed at the site.

Restoration activities included installation of a storm water control system to drain the surface of the backfilled quarry and discharge storm water to a drainage channel adjacent to the site. The system includes an inlet structure with skimmer and an 18-inch diameter pipe discharging through an end-wall into riprap and the drainage channel. The site was covered with a minimum 6-inch layer of topsoil, fertilized and seeded with annual and perennial ryegrass. Support areas including staging areas, decontamination pad, stone entrances, and the stone access roads were removed. Samples were collected from below the haul roads and decontamination pad to verify that no contamination resulted from construction activities. The access road was replaced with new stone.

A pre-certification inspection was conducted by EPA on August 19, 2010. Based on results of the post-excavation soil samples, the remedial action implemented at OU3 was successful in removing all impacted soil. The soils remaining do not present an unacceptable risk and leaching of potential contaminants to the groundwater at unacceptable levels should not occur. On December 15, 2010, the PRP Group submitted a report to the EPA entitled "Remedial Action Report for Operable Unit 3 – Quarry 3" which documented the results of the remedial activities that were completed at OU3.

Ongoing operation and maintenance (O&M) activities include periodic inspections and necessary repairs for erosion and vegetation growth.

#### Operable Unit 4 – Quarry 4

The ROD called for a cap to prevent infiltration of surface water into the contaminated soils of Quarry 4. The cap was to be constructed in accordance with the Commonwealth's Residual Waste Management Regulations, for final cover of Class 1 residual waste landfills, set forth at 25 Pa. Code Sections 288.234 and 288.236-237. Prior to issuance of the ROD, Liberty performed a due diligence investigation and remediation of the 2201 and 2301 Renaissance Boulevard properties and commenced development of the site for use as an office park. A portion of Quarry 4 was developed and includes a portion of an office building, parking areas, and a lined storm water retention basin. In 2001, Liberty requested a waiver of the capping and drainage layer requirements; however, PADEP and EPA determined additional information and data would be needed to demonstrate that there would be no impact to groundwater if infiltration of surface water into the quarry were not limited.

Penn E&R, on behalf of Liberty, submitted an RD Work Plan for the Quarry 4 Demonstration Project which was approved by EPA on June 29, 2004. The work plan provided a summary of available data and proposed additional data collection activities including soil borings to collect samples at various intervals throughout the quarry and additional sampling of nearby monitoring wells. These activities were conducted between 2004 and 2008. The results of the additional data collection activities were presented in the "Interim Remedial Design

Report (IRDR) for the Quarry No. 4 Demonstration Project” approved by EPA on July 22, 2010. The IRDR summarized the data and provided a work plan to finalize requirements needed to complete the Demonstration Project. The IRDR included identification of all wells needed for sampling, including installation of three new wells to provide adequate coverage of the groundwater regime at Quarry 4, duration and frequency of sampling, analytical requirements, and data evaluation procedures.

In July 2010, three soil borings were advanced in the fill material placed on Quarry 4 as part of development of Liberty Property Trust’s (LPT) 2201 Renaissance Boulevard property. Samples were collected to evaluate if contaminants were present in the fill which could potentially impact groundwater. No contamination above screening levels was detected. In August 2010, three new monitoring wells were installed. The wells were developed in September 2010.

The Demonstration Project includes sampling of seven monitoring wells on a quarterly basis over a two year period and a statistical analysis of the data to determine if constituents in Quarry 4 are impacting groundwater. Well locations are shown on the figure in Attachment 3. Sample analysis is for volatiles, semi-volatiles, and metals. The first round of sampling for the Demonstration Project was conducted in October 2010, the second round was performed in January 2011, the third round was conducted in April 2011, and the fourth round was conducted in July 2011. The eighth and final round of sampling is scheduled for July 2012. Until a minimum of four quarters of data are collected, meaningful statistical analysis on the data cannot be performed; however, results from the initial two rounds of monitoring do not show higher levels of contamination in downgradient wells in comparison to upgradient wells with the exception of a single result for cyanide in well MW-17S. Cyanide was detected at 11.3 ug/l, which is above the groundwater standard of 10 ug/l, in the sample collected in January 2011. Samples from this well collected in October 2010 and during the MNA (OU6) sampling in November 2010 and February 2011 did not detect cyanide.

#### Operable Unit 5 – WAL Pipeline

Liberty owns the properties located at 2201 and 2301 Renaissance Boulevard. The 2201 Renaissance Boulevard property was developed by Liberty and is currently occupied by an office building, associated parking lots and a storm water detention basin. Liberty has also completed development of the adjacent 2301 Renaissance Boulevard property with a second office building, associated parking lots, and two storm water detention basins.

As part of Liberty’s due diligence survey for the 2201 and 2301 Renaissance Boulevard properties, Liberty retained Penn Environmental & Remediation, Inc. (Penn E&R) to complete due diligence and a site characterization of the property. During this site characterization, Penn E&R encountered two buried pipelines located one on top of the other on the west side of the property. The pipelines entered the site near Renaissance Boulevard and ran south/southwest along a dirt access road to a point where they exited the property in the southwest corner of the parcel. The buried pipelines appear to have followed the course of, and to have been located

directly beneath, an aboveground pipeline which was also reportedly located in this area. The pipelines transported WAL from the former Alan Wood Coke facility, which was located about one mile east of the site, to Quarry 1, 2, and 3 located on the Site. No portions of the reported aboveground pipeline were ever identified on these properties.

Penn E&R implemented a program of pipeline removal and additional sampling. The activities implemented were outlined in a work plan developed by Penn E&R entitled "Work Plan to Complete Additional Site Characterization Activities and To Remove a Buried Pipeline at the Yellow Parcel (2201 and 2301 Renaissance Boulevard properties) in the Renaissance Park Commercial Development," dated June 25, 1998. The activities outlined in the Work Plan and which were implemented included the following: 1) collection and analysis of surface and subsurface soil samples along the length of the former pipeline; 2) the collection and analysis of sediment samples from an adjacent drainage swale; 3) the removal of the buried pipeline; 4) the excavation of potentially impacted soil located beneath the buried pipeline; 5) the collection of post-excavation soil samples from the remediated areas; and 6) the implementation of a focused risk assessment.

The pipeline was removed in two separate phases. The first phase was implemented in September 1999 and included the removal of the northern half of the pipeline. The southern half of the former pipeline ran through a portion of an area designated as a wetland. Prior to removing the pipeline from this wetland area, Chester Valley Engineers, on behalf of Liberty, submitted a General Permit No. 5 Application to PADEP to remove the pipeline from the wetland area. PADEP approved this request and in April of 1999 issued a general permit to complete this work. The PADEP permit number for this work was GP No. 054699324. On January 18, 2000, a Revised Erosion and Sediment Pollution Control (ESPC) Plan developed by Chester Valley Engineers was submitted to the Montgomery County Conservation District (MCCD). This revised ESPC plan incorporated the activities associated with the removal of the pipeline from the wetland area. On January 20, 2000, the MCCD approved the revised plan and issued a general permit (General permit #PAR10T555) to complete the removal of the pipeline from the wetland area. After obtaining all appropriate permits, the southern half of the pipeline was removed in March 2000.

As part of the site characterization, surface and subsurface soil samples were collected along the length of the former pipelines and sediment samples were collected from a swale that drained the western end of the 2301 Renaissance Boulevard parcel. The results of this sampling indicated that soils at five specific locations along the pipelines had been impacted by the pipeline; however, no impact to the swale was documented. These five areas along the former pipes were remediated, and all potentially impacted soil (approximately 220 cubic yards) was excavated from these areas. Upon completion of the remedial activities, post-excavation soil samples were collected and each area was backfilled with clean soil.

The results of the analysis of the post-excavation samples and other samples collected during the site characterization indicate that remaining soils and sediments, based on comparison to PADEP Act 2 non-residential Statewide Medium Specific Concentrations (MSCs), do not

present a human health concern. Several of the analytical results included PAH compounds and the metals arsenic, iron and lead at concentrations that exceeded their EPA Risk Based Concentrations (RBCs). To ensure that these exceedances did not represent an unacceptable risk, a site-specific risk assessment was completed. The results of the risk assessment indicated that the future use of the 2301 Renaissance Boulevard property for commercial purposes would not result in an unacceptable risk to industrial workers, construction workers, or adolescent trespassers.

Other sections of the WAL pipeline that were not addressed in these prior actions required investigation and remediation as specified in the ROD. These include the portion of pipeline on the O'Neill parcel, a section of pipeline on Liberty's 3000 Horizon Drive property, and the continuation of that section of pipeline that leaves the 3000 Horizon property and runs through and adjacent to the Willamsburg Commons property and through the 2201 Renaissance Boulevard property.

The section of the pipeline which traversed the 2200 Renaissance Boulevard property was investigated as part of a Phase II Environmental Assessment conducted by URS Corporation for the property owners in 2002. This property contains the building referred to as the Triad Building. The investigation included a ground-penetrating radar (GPR) survey at the location of the pipeline run to evaluate if the pipeline had been removed during land development or remained at the property. The GPR survey showed anomalies suggestive of buried metallic debris, storm and sanitary sewer lines and a linear anomaly potentially indicating the presence of the former pipeline in the northern portion of the property. This anomaly was not continuous through the property. Based on the results of the GPR survey, a total of 19 soil borings were advanced at approximately 50-foot intervals along the length of the pipeline run. Borings were advanced to depths of 12 feet below ground surface and screened at 2-foot intervals for evidence of visual or olfactory contamination. Samples were also screened using a PID. No evidence of contamination was observed; however, samples were collected from 9 borings at depths where the pipeline would be expected to be encountered. All results for metals, VOCs, and PAHs were either non-detected or below PADEP Act 2 MSCs. Based on the results, no soil contamination associated with the pipeline was present at this parcel.

Liberty submitted the "Remedial Design Work Plan for Investigation of the Former WAL Pipeline at 3000 Horizon Drive" which was approved by EPA on March 1, 2005. The investigation commenced on March 7, 2005 with an electromagnetic survey to identify the approximate location of the pipeline on the Liberty property. The sections of the pipeline remaining on the property were identified, and test pits were installed to confirm the geophysical survey and ensure no other sections of pipeline were present on the site.

Liberty submitted the "Remedial Action Work Plan for the WAL Pipeline Removal at 3000 Horizon Drive" which was approved by EPA on February 8, 2006. The RAWP detailed procedures for excavating the pipeline and pipeline route, post-excavation soil sampling, and site restoration activities. Remedial construction started on November 15, 2005; approximately 70 feet of pipeline and impacted soils were removed and post-excavation soil samples were

collected. Post-excavation soil results showed that PAHs remained at levels above ROD performance standards. Liberty submitted a RAWP Addendum to address the remaining contamination. The RAWP Addendum was approved by EPA on May 25, 2006. In June 2006, additional remedial action including further excavation and off-site disposal of impacted soils was completed. Post-excavation sample results showed only slight exceedances of screening criteria; therefore, a focused risk assessment was conducted. Results showed no unacceptable risks to human health based on the most conservative (residential) exposure scenarios and no unacceptable leaching potential to groundwater; therefore, the remaining soils met risk-based cleanup criteria permitting unrestricted future use of the site.

The remediation included removal of the pipeline and impacted soils to the property line bordering Williamsburg Commons. A total of 155 cubic yards (230 tons) of impacted soils were removed and disposed off-site. The site was restored to as near as original conditions as possible. Excavations were stabilized with modified 2A stone, backfilled with clean soils and topsoil, reseeded and mulched. The area has been allowed to become naturally revegetated as this portion of the property was unused and not maintained or landscaped. Remedial activities were documented in a report titled "Final Report for the WAL Pipeline Removal at 3000 Horizon Drive" which was approved by EPA on January 12, 2007. There are no ongoing O&M activities as the parcel was remediated to standards permitting unrestricted use.

O'Neill submitted a RD Work Plan for the pipeline section adjacent to the southern side of Quarry 2. EPA approved the work plan on July 21, 2005. On March 15, 2007, EPA approved the "Remediation Plan for the PADEP Area of Concern and Former WAL Pipeline": Remedial actions were performed in accordance with the Remediation Plan which called for excavation of a 160 foot by 15 foot wide area (approximately 150 cubic yards) of impacted soils and slag materials. Remedial construction was performed on April 20, 2007 and April 23, 2007. Deposits of slag material were visible throughout the excavation area and were removed. Small sections of pipeline were also present and removed. These materials were transported to Quarry 2 and placed in a stockpile in the quarry. The OU2 discussion presents details on waste handling from areas of concern outside Quarry 2 and the relocation of these materials to Quarry 2. Post-excavation samples were collected from the sidewalls and floor of the excavation and a risk evaluation was performed. Results were compared to the performance standards used for the ROD's pipeline cleanup standards and all results were below these levels. A summary of the remedial action and risk evaluation was presented in a report titled "Report of Results and Streamlined Human Risk Assessment for the PADEP AOC and Former WAL Pipeline Remediation" approved by EPA on September 17, 2007.

From April to June 2006, the Group performed investigations of the remaining areas where the WAL pipeline had not been investigated or remediated. These areas include west of Flint Hill Road to Liberty's 3000 Horizon Drive property (RAGM parcel) and from the southwestern corner of the 3000 Horizon property west-southwest to Horizon Drive. The investigation included electromagnetic surveys, including radio-tracing of the pipeline from the terminus at the corner of the 3000 Horizon Drive and Williamsburg Commons property, and test pit and soil boring investigations and sampling. The investigation showed approximately 190

feet of pipeline remaining and elevated levels of SVOCs in soils in the area of undisturbed pipeline sections in the area of Williamsburg Commons. No pipeline remnants were identified in the area from Flint Hill Road to Liberty's 3000 Horizon Drive property. Results were provided in an investigation report approved by EPA on September 21, 2009. A risk assessment was also performed which identified four areas for soil remediation at the Williamsburg Commons area where PAHs and arsenic were at levels that presented unacceptable risks for residential exposure.

The Group prepared a Remedial Design and Remedial Action Work Plan for remediation of these remaining areas of the pipeline and impacted soils. The RD/RAWP was approved by EPA on October 7, 2009. Remedial construction was implemented from October 14, 2009 through November 19, 2009. The four areas with pipeline remnants and soil contamination were excavated; approximately 190 feet of 4-inch diameter pipeline and 190 cubic yards (365 tons) of soil were removed and disposed off-site. Post-excavation samples were collected from the excavation sidewalls and floor for use in a risk evaluation to determine if risk-based performance standards were achieved. The excavation was backfilled with imported clean fill and topsoil and the disturbed areas were raked, seeded and mulched. Trees that were removed or damaged during the remedial action were also replaced. A pre-certification inspection was conducted by EPA on May 5, 2010 to verify that onsite construction and restoration activities were completed.

The Group prepared a risk evaluation based on the post-excavation sample results which concluded there were no unacceptable risks to adult or child residential receptors or leaching to groundwater; therefore, the remediation was considered complete. EPA approved the risk evaluation on March 19, 2010. On August 10, 2010, the Group submitted the "Remedial Action Report for the Former WAL Pipeline (Operable Unit 5)".

Since no permanent or semi-permanent structures were constructed and contaminated soils were remediated to levels for unrestricted use at the Williamsburg Commons property, no long-term O&M is required. As per the warranty, the site was monitored for a one-year period to assure that grass has been re-established.

#### Operable Unit 6 – Groundwater Monitored Natural Attenuation

As specified in the ROD, groundwater monitoring will be conducted at on-site and off-site locations, in order to sample for selected Site-related SVOCs, metals, cyanide, and VOCs that presently exceed preliminary remediation goals. Additional parameters representative of the natural attenuation process will also be included in the monitoring program. This monitoring will provide a basis to determine the rate at which natural attenuation is taking place.

The Group prepared a Pre-Design Investigation Work Plan for MNA which was approved by EPA on April 13, 2006. The work plan detailed the data collection requirements to evaluate groundwater conditions and update the conceptual site model. Field activities, including monitoring well sampling and water level measurements, were conducted in 2006 and the MNA Pre-Design Investigation Report was submitted, revised, and approved by EPA on March 19, 2008. The PDI report also provided a plan for additional field activities required to

fill data gaps and prepare the MNA RD. The PDI report recommended test borings and sampling, packer testing and geophysical logging of the borings, construction of monitoring wells in the borings, and a complete round of site-wide sampling and water level measurements. A Supplemental PDI Work Plan for this additional work was submitted and approved by EPA on April 9, 2008. Field activities were conducted from May through July 2008 and the Supplemental Pre-Design Investigation Results report was submitted on December 5, 2008. The results from this report served as the basis for developing the MNA sampling strategy.

The Monitored Natural Attenuation Work Plan, submitted by the Group, was approved by EPA on August 17, 2010 and provides the sampling and data evaluation requirements for the MNA remedy. Sampling will be performed at 17 monitoring wells for volatiles, semi-volatiles, metals, cyanide, and other MNA parameters. Well locations are shown on Figure 4. The initial monitoring program frequency is quarterly for three years, with an evaluation regarding future frequency performed after completion of the second year of monitoring. After performance standards are achieved, monitoring will be quarterly until results for all wells are below performance standards for four consecutive quarters.

The first round of MNA sampling was performed in November 2010, the second round in February 2011, and the third round in May 2011. Results from the initial rounds of monitoring show the highest levels of contamination in the vicinity of Quarry 1 (MW-6; benzene and naphthalene), Quarry 2 (MW-13S; SVOCs, benzene, acetone, cyanide), and Quarry 3 (MW-11S and MW-11D; SVOCs, benzene, arsenic). Wells further away from these sources show significantly lower levels of contamination although performance standards for inorganics (arsenic, cyanide, selenium) are exceeded at most wells included in the MNA monitoring. Wells north-northeast of Quarries 2 and 3 also showed exceedances of extent of plume standards for naphthalene (MW-20S), benzene (MW-20S), and chloroform (MW-15S, MW-15D, MW-20S). These results generally show the same contaminant patterns as historical results; however, the wells near Quarry 3 (particularly in MW-11D) have shown declining concentrations of SVOCs in the samples after completion of the remedial action at Quarry 3. Results for MNA parameters from MW-11D show favorable conditions for anaerobic degradation (low dissolved oxygen, and high levels of methane, dissolved iron, and dissolved manganese).

#### Operable Unit 7 – Cinder/Slag Fill Area

Liberty owns the properties located at 2201 and 2301 Renaissance Boulevard. The 2201 Renaissance Boulevard property was developed by Liberty and is currently occupied by an office building, associated parking lots and a storm water detention basin. Liberty has also completed development of the adjacent 2301 Renaissance Boulevard property with a second office building, associated parking lots, and two storm water detention basins.

As part of Liberty's due diligence survey, an area of fill material was identified in the north-central portion of their 2301 Renaissance Boulevard property. This fill area was designated the Cinder/Slag Fill Area (CSFA). The CSFA was characterized through the installation of test pits and soil borings and the submittal of samples for laboratory analysis.

Based on the results of these previous site characterization activities, the material in the CSFA was determined to consist primarily of glass, ash, coal dust, cinders, and slag, and encompassed an area 250 feet long by 150 feet wide. The thickness of the fill ranged from 1-foot along the perimeter of the area, to up to 20 feet in the central portion of the CSFA. However, the fill material was, on average, from 3 to 4 feet thick. The source of the fill is not known; however, based on historical aerial photographs, it was placed in this area prior to 1959.

The ROD selected capping, in accordance with 25 PA Code Sections 288.234 and 288.236-237, as the appropriate remedy for Quarries 1, 2 and 4 and other contaminated soil areas, and the excavation and off-site disposal of impacted soils/sediments located in Quarry 3. Although not investigated as part of the Crater RI/FS or identified as an area of concern in the ROD, EPA considered the CSFA to be a contaminated soil area related to the Crater Resources site and designated this area OU 7.

Liberty discussed with EPA the remediation of the CSFA via capping and/or the excavation and off-site disposal of the contents of this area. Based on these discussions, the remedial action implemented at the CSFA included the excavation and off-site disposal of all potentially impacted materials and soils. The implementation of this remedy enabled the planned development to proceed on schedule, and without any impacts on the planned use of the property (which included the construction of an office building and parking garage). This remedy meets the Remedial Action Objectives and Performance Standards of Section VIII and XII, respectively, of the ROD, and satisfies the Statutory Determinations of Section XIII of the ROD. In addition, EPA in the ROD's Responsiveness Summary acknowledged that flexibility during the RD for land development considerations was allowed.

The remedial actions implemented in the CSFA were completed in accordance with the document developed by Penn E&R on behalf of Liberty entitled "Remedial Design/Remedial Action Work Plan for the Cinder/Slag Fill Area Located at 2301 Renaissance Boulevard in Upper Merion Township, Montgomery County, PA", dated October 10, 2001 (Final). This work plan was approved by the EPA on October 29, 2001.

The remediation of the CSFA was implemented between September and November 2001 and included the excavation and off-site disposal of approximately 5,500 cubic yards or 7,100 tons of potentially impacted fill and soil. Upon completion of the remedial activities, forty nine post-excavation soil samples were collected from the CSFA. No site-specific cleanup standards for the CSFA were included in the ROD. However, based upon discussions with and approval of EPA, a Focused Risk Assessment (FRA) was implemented using the results of the post-excavation sampling to evaluate the effectiveness of the remedial activities implemented in the CSFA. Potential risks to industrial and on-site adult construction workers were evaluated, as were potential impacts to groundwater.

Based on results of the post-excavation soil samples and the FRA, the remedial action implemented in the CSFA was successful in removing all potentially impacted soil. The soils remaining in the CSFA do not present an unacceptable risk to construction or industrial/office



workers at the site, and leaching of potential contaminants to the groundwater at unacceptable levels will not occur. On September 22, 2003, Liberty submitted a report to the EPA entitled "Remedial Action Report for the former Cinder/Slag Fill Area Operational Unit 7" which documented the results of the remedial activities that were completed in the former CSFA, which EPA approved in a letter dated September 30, 2003.

Liberty has developed the 2301 Renaissance Boulevard property for commercial office use only, consistent with the commercial use zoning of this property, and does not intend to use the 2301 Renaissance Boulevard property for any residential or child care purposes. Given that no residential assessments have been performed, Liberty will implement an institutional control for the CSFA at the 2301 Renaissance Boulevard property to notify any future owners of the need for additional assessment in the event of residential use or development of the CSFA. The notification will be included in the deed to the 2301 Renaissance Boulevard property upon any future transfer of this property by Liberty to a new owner. The notice may also incorporate notice and controls for other areas of the Renaissance Boulevard property as needed.

#### Operable Unit 8 – Area 6 – Former Dump Area

Area 6 is located south-southwest of Renaissance Boulevard and north-northeast of Quarry 4. The unused parcel is vegetated with grass, brush and trees. Area 6 was identified during a 1997 geophysical investigation to determine subsurface conditions for future development. Due to the contamination encountered during the geotechnical investigation, a remedial investigation was performed in 1999 for the PRP Group. In addition, Liberty performed an additional investigation in October 2000 leading to the discovery of another disposal area east of the area where the 1999 remedial investigation occurred. This area has been designated the Southeast Property Area (OU9) as discussed below. The portion of Area 6 identified during the geophysical investigation has been designated the Former Dump Area (OU8).

Although not investigated as part of the Crater RI/FS or identified as an area of concern in the ROD, EPA considered the Former Dump Area to be a contaminated soil area related to the Crater Resources site and designated this area OU8. The ROD selected capping, in accordance with 25 PA Code Sections 288.234 and 288.236-237, as the appropriate remedy for Quarries 1, 2 and 4 and other contaminated soil areas, and the excavation and off-site disposal of impacted soils/sediments located in Quarry 3. The Responsiveness Summary in the ROD noted that other contaminated soil areas would be more fully evaluated during remedial design activities and allowed for flexibility during the RD to reflect land development considerations. The ROD did not provide cleanup standards for this area, but indicated that cleanup standards for soil and sediment at the Crater Resources Site are based on health risks.

On August 20, 2003 EPA approved a Pre-Design Investigation Work Plan for Area 6 submitted by the PRP Group. The investigation was performed in September and October 2003 to determine the extent of fill material at OU8 and OU9. Subsurface investigation was performed using test pits and direct-push methods and the results were provided in the "Area 6

Operable Unit 8 Pre-Design Investigation Summary Report”, which contained data for OU8 and OU9, dated May 2004.

Based on the results of the PDI, the “Health Risk Assessment for Former Dump Area (Area 6 - Operable Unit 8)” was submitted on December 2, 2008 and approved by EPA on March 31, 2009. The risk evaluation identified unacceptable future risks to receptor populations if the impacted materials were encountered. The risk assessment also identified that removal of impacted materials at one location at a depth of 5 feet would eliminate the adverse risk.

After discussions with EPA, the implemented remedy was excavation of the impacted soils identified in the risk assessment because of the small area and impracticality of capping this area. Removal of impacted soils from this area would also allow reuse of that portion of the parcel. This remedy meets the Remedial Action Objectives and Performance Standards of Section VIII and XII, respectively, of the ROD, and satisfies the Statutory Determinations of Section XIII of the ROD. A Remedial Design/Remedial Action Work Plan for excavation of impacted soils was submitted by the PRP Group on September 25, 2009 and approved by EPA on December 10, 2009.

The RD specified an initial removal of a 20-foot by 20-foot area to a depth of 6 feet at which point post-excavation samples would be collected to determine if performance standards were met. This excavation was conducted on December 22, 2009. Approximately 90 cubic yards (120 tons) of impacted soil was removed and disposed off-site. Results from post-excavation samples indicated that performance standards had been met, and the excavation was backfilled and restored on January 21 and 22, 2010. A pre-certification inspection was conducted by EPA on May 5, 2010 to verify that onsite construction and restoration activities were completed. A risk assessment providing an evaluation that the remediation had attained performance standards was submitted and approved by EPA on June 1, 2010.

Based on results of the post-excavation soil samples, the remedial action implemented at OU8 was successful in removing all potentially impacted soil. The soils remaining at OU8 do not present an unacceptable risk to outdoor, indoor, and future construction workers, and leaching of potential contaminants to the groundwater at unacceptable levels will not occur. On July 20, 2010 the PRP Group submitted a report to the EPA entitled “Remedial Action Report for Area 6/Lot 44 Former Dump Area – Operable Unit 8” which documented the results of the remedial activities that were completed at OU8. EPA approved the RA Report in a letter dated December 14, 2010.

Since no permanent or semi-permanent structures were constructed, no long-term O&M is required. As per the warranty, the site was monitored for a one-year period to assure that grass had been re-established.

## Operable Unit 9 – Southeast Property Area

The Southeast Property Area consists of a portion of Area 6/Lot 44 which also contains OU8. This area is primarily an open, maintained lawn east of OU8 and adjacent to Renaissance Boulevard across from Lot 7. Area 6 was identified during a 1997 geophysical investigation to determine subsurface conditions for future development. Due to the contamination encountered during the geotechnical investigation, a remedial investigation was performed in 1999 for the PRP Group. In addition, Liberty performed an additional investigation in October 2000 and discovered the fill material in the area that later was named the Southeast Property Area or Southeast Property Area (OU9).

Although not investigated as part of the Crater RI/FS or identified as an area of concern in the ROD, EPA considered the Southeast Property Area to be a contaminated soil area related to the Crater Resources site and designated this area OU9. The ROD selected capping, in accordance with 25 PA Code Sections 288.234 and 288.236-237, as the appropriate remedy for Quarries 1, 2 and 4 and other contaminated soil areas, and the excavation and off-site disposal of impacted soils/sediments located in Quarry 3. The Responsiveness Summary in the ROD noted that other contaminated soil areas would be more fully evaluated during remedial design activities and allowed for flexibility during the RD to reflect land development considerations. The ROD did not provide cleanup standards for this area, but indicated that cleanup standards for soil and sediment at the Crater Resources Site are based on health risks.

On August 20, 2003 EPA approved a Pre-Design Investigation Work Plan for Area 6 submitted by the PRP Group. The investigation was performed to determine the extent of fill material at OU8 and OU9. Subsurface investigation was performed using test pits and direct-push methods and the results were provided in the "Area 6 Operable Unit 8 Pre-Design Investigation Summary Report", which contained data for OU8 and OU9, dated May 2004.

Based on the results of the prior investigations, the "Health Risk Assessment for Southeastern Property Area (Area 6- Operable Unit 9)" was submitted on August 15, 2008. The risk evaluation identified unacceptable future risks to receptor populations if the impacted materials were encountered. The risk assessment also identified that removal of impacted materials at one location at a depth of nine feet would eliminate the adverse risk.

In May 2009, additional investigations were conducted by the PRP Group to determine the extent of cinder/slag fill material relative to the location of underground utilities on the property. After utility mark-out, direct-push and test pit samples were collected when cinders/slag were encountered. This work was performed to supplement the remedial design for OU9.

After discussions with EPA, the implemented remedy was excavation of the impacted soils identified in the risk assessment because of the small area and impracticality of capping this area. A cap at this area would have potentially required relocation of utilities including water, electrical, and sewer lines. Removal of impacted soils from this area would also allow reuse of

that portion of the parcel. This remedy meets the Remedial Action Objectives and Performance Standards of Section VIII and XII, respectively, of the ROD, and satisfies the Statutory Determinations of Section XIII of the ROD. A Remedial Design/Remedial Action Work Plan for excavation of impacted soils was submitted by the PRP Group on September 25, 2009 and approved by EPA on December 10, 2009.

Remedial construction started at OU9 on December 22, 2009 and was conducted in stages to allow for sidewall sample collection at specific depths until the target depth of 10 feet was reached on January 8, 2010. Post-excavation sample results were evaluated and it was determined that additional excavation would be required to meet the risk-based performance standards. Additional excavation was conducted on January 11, 2010; however, performance standards were still not attained. On January 19, 2010, excavation was continued resulting in a final excavation area of 33 feet by 29 feet by 10 feet deep. Post-excavation samples indicated that the performance standards were met. An estimated total of 350 cubic yards (545 tons) of impacted soils were disposed off-site. On January 21, 2010, the excavation area was backfilled and restored. A pre-certification inspection was conducted by EPA on May 5, 2010 to verify that onsite construction and restoration activities were completed.

Based on results of the post-excavation soil samples, the remedial action implemented at OU9 was successful in removing all potentially impacted soil. The soils remaining at OU9 do not present an unacceptable risk to outdoor, indoor, and future construction workers, and leaching of potential contaminants to the groundwater at unacceptable levels will not occur. On July 15, 2010 the PRP Group submitted a report to the EPA entitled "Remedial Action Report for Area 6/Lot 44 Southeast Property Area – Operable Unit 9" which documented the results of the remedial activities that were completed at OU9. EPA approved the RA Report in a letter dated December 14, 2010.

Since no permanent or semi-permanent structures were constructed, no long-term O&M is required. As per the warranty, the site was monitored for a one-year period to assure that grass had been re-established.

#### Operable Unit 10 – Lot 7

Lot 7 was identified after the issuance of the ROD for the Site. As part of Liberty's due diligence survey of Lot 44 (which was not purchased by Liberty), an area of fill material was identified located south of OU8 (Area 6). This area was divided into OU9 (Southeast Property Area) and OU10 (Lot 7). The fill was determined to consist primarily of ash, coal dust, cinders, and slag. Lot 7 is on the opposite side of Renaissance Boulevard from OU8 and OU9 and extends approximately 1,100 feet north from Swedeland Road. The 130 feet wide lot contains open grass areas mixed with areas of trees and brush. The northern section of the lot is a landscaped berm that slopes steeply from Renaissance Boulevard east-northeast. Lot 7 is deed restricted as permanent green space and cannot be developed. East-northeast of the berm at Lot 7 are office buildings including a day care facility.

Although not investigated as part of the Crater RI/FS or identified as an area of concern in the ROD, EPA considered Lot 7 to be a contaminated soil area related to the Crater Resources site Area 6 and designated this area OU10. The ROD selected capping, in accordance with 25 PA Code Sections 288.234 and 288.236-237, as the appropriate remedy for Quarries 1, 2 and 4 and other contaminated soil areas, and the excavation and off-site disposal of impacted soils/sediments located in Quarry 3. The Responsiveness Summary in the ROD noted that other contaminated soil areas would be more fully evaluated during remedial design activities and allowed for flexibility during the RD to reflect land development considerations. The ROD did not provide cleanup standards for this area, but indicated that cleanup standards for soil and sediment at the Crater Resources Site are based on health risks.

The PRP Group conducted an investigation of Lot 7 in October 2003. The investigation was performed in accordance with a Remedial Design Work Plan for Area 6, approved by EPA on August 20, 2003, and included test pits, direct-push borings, and hand-auger samples to determine the extent of cinder slag impacted soils. One boring showed elevated levels of SVOCs, including naphthalene; therefore additional investigation was required to further delineate the extent of contamination in this area. Additional investigation was performed in April 2004 in accordance with a work plan amendment submitted on April 13, 2004. Results of the investigation are presented in the Pre-Design Investigation Summary Report for Lot 7 submitted on February 16, 2006.

Although the ROD did not address Lot 7 specifically, the ROD required capping of other contaminated areas to prevent leaching of contaminants to groundwater; but allowed for flexibility during the RD based on land development plans and evaluation of other data. The ROD did not specify cleanup standards for Lot 7, but indicates that soil cleanup standards are based on health risk. A risk assessment was performed in 2007 and indicated that after removal of soils in two areas at Lot 7 residual levels of contaminants of concern would not present adverse risks to human health and the environment, including leaching of contaminants to groundwater. Based on the results of the investigations and risk assessment, the PRP Group prepared a Remedial Design for removal of impacted soils to a depth of 8 feet and a subsequent risk evaluation based on results from post-excavation sampling. After discussions with EPA, excavation was implemented due to limited quantities of impacted soils and impracticability of capping this area. This remedy meets the Remedial Action Objectives and Performance Standards of Section VIII and XII, respectively, of the ROD, and satisfies the Statutory Determinations of Section XIII of the ROD. EPA approved the Remedial Design/Remedial Action Work Plan for excavation of impacted soils on November 24, 2009.

The Remedial Action at Lot 7 was conducted from December 2009 to January 2010. Impacted soils were excavated on December 5 and 6, 2009 and post-excavation samples were collected. Results of a preliminary risk assessment based on the post-excavation results indicated that additional excavation was required; and excavation resumed on December 12, 2009. An estimated 290 cubic yards (430 tons) of impacted material was removed during the two excavation events and disposed off-site. The risk calculations based on post-excavation samples collected on December 12, 2009 indicated that the risk-based performance standard had

been achieved, and the excavation area was partially backfilled. Weather delays prevented restoration of the excavation area with clean fill, topsoil and seed mixture until January 9, 2010. A pre-certification inspection was conducted by EPA on May 5, 2010 in order to assess the re-establishment of vegetation growth. The formal risk evaluation was submitted and approved by EPA on June 2, 2010.

Based on results of the post-excavation soil samples, the remedial action implemented at Lot 7 was successful in removing all potentially impacted soil. The soils remaining at Lot 7 do not present an unacceptable risk to outdoor, indoor, and future construction workers, and leaching of potential contaminants to the groundwater at unacceptable levels will not occur. On August 3, 2010, the PRP Group submitted a report to the EPA entitled "Remedial Action Report for Lot 7 Operable Unit 7" which documented the results of the remedial activities that were completed at Lot 7. EPA approved the RA Report in a letter dated August 2, 2011.

Since no permanent or semi-permanent structures were constructed, no long-term O&M is required. As per the warranty, the site was monitored for a one-year period to assure that grass had been re-established.

#### Results of Implemented Actions

Actions at OU1 and OU2 have consolidated all impacted materials which have been covered by temporary caps preventing direct exposure to contamination. These temporary measures have met the intended purpose of mitigating direct contact with contaminated materials. Construction of the permanent caps will prevent further migration of contaminants to groundwater which will achieve the RAOs for these OUs.

The RAs which have been completed at OU3, OU5, OU7, OU8, OU9, and OU10 have achieved the intended purpose of meeting the established performance standards by removing contamination that could present adverse impacts to human health or the environment. The RAOs for each of these OUs have been met.

Groundwater monitoring for OU4 and OU6 is being implemented. Both OUs are in the initial year of monitoring; therefore, there is no statistical strength in the data to determine if performance standards and RAOs will be met. After two years of data is collected at OU4, a statistical evaluation will be conducted to determine if remedial action is needed. Preliminary MNA (OU6) monitoring indicates that degradation of contaminants in the center of the plume is occurring. Reductions of contaminants in groundwater may also be attributable to source removal activities at OU3.

#### Kindercare Learning Center – Vapor Intrusion Investigation

The Kindercare Learning Center is located at 2001 Renaissance Boulevard. Due to the proximity of the day care to Lot 7 and the groundwater plume, an indoor air quality sampling program was conducted to evaluate the potential for contaminants present at Lot 7 and/or the

groundwater to be introduced into indoor air via vapor intrusion. The Group prepared the "Indoor Air Quality Sampling Plan for the Kindercare Learning Center" which was approved by EPA on March 6, 2009. Field activities were conducted between March 25, 2009 and April 11, 2009 and included collection of subslab, indoor air, and outdoor ambient air samples. Results did not show the presence of contaminants above EPA's screening levels with the exception of benzene which was detected in both indoor and outdoor air samples at levels slightly above EPA screening levels. Further evaluation of the benzene results including results from PADEP air monitoring stations in the area, showed the benzene levels were comparable to ambient air background levels. EPA also conducted additional risk analysis and concluded that the results did not present an unacceptable risk. Results of the investigation are documented in a report titled "Air Quality Report for Kindercare Learning Center" approved by EPA on June 3, 2010.

### Institutional Controls

The ROD called for institutional controls (e.g., easements and covenants, title notices and land use restrictions) to prevent any disturbance of the cap once installed, as well as to preclude the installation of any potable wells in the contaminated aquifer. Such restrictions have been implemented for portions of the property. In addition, the PRPs have or will place institutional controls to restrict residential use consistent with the protectiveness of the ROD and the associated cleanup standards, but which is beyond the requirements of the ROD.

A Restrictive Covenant between the Crater PRP Group and the owners of four lots impacted by the Site was entered into on December 21, 2005. This covenant prohibited the installation or use of new groundwater wells or use of any existing groundwater wells; as well as prohibiting any residential use of these lots. In addition, residents in the immediate area of contamination obtain their drinking water from a public water supply, and therefore are not exposed to contaminated groundwater. No residents are using the groundwater for drinking purposes in the immediate area of contamination.

On February 1, 1997, the Montgomery County Health Department's (MCHD) Division of Water Quality Management adopted Chapter XVII, Individual Water Supply Regulations and amended these regulations on August 1, 2003. Pursuant to Section 17-2, the purpose of these regulations is "to establish minimum standards for location, construction, modification or abandonment of individual water supply wells and system installation for protection of public health and welfare."

Accordingly, Section 17-5 of the Regulations provides a permitting procedure that enables the MCHD Division of Water Quality Management to "approve the location, construction, and testing for all individual water supply wells and approve the operation of an individual water supply system" in order to ensure a potable water supply that protects public health and welfare. Section 17-5.2 makes it unlawful to install or modify an individual water supply well without first obtaining a permit from MCDH. If an individual supply well is installed or modified without a permit, Chapter XXI of the Regulations sets forth an enforcement scheme which provides for the notification of violations of the Public Health Code, the issuance

of emergency orders to protect the public health, and the imposition of penalties for violations of any portion of the Public Health Code.

Section 17-10 of the Individual Water Supply System Regulations specifically requires that all water must be tested and that it must meet the PADEP drinking water standards included therein. These drinking water standards are equivalent to the Safe Drinking Water Act Maximum Contaminant Levels (MCLs). If the water fails to meet the specified criteria, then Section 17-11 requires treatment of the water. The adoption of these well regulations by MCHD has provided a reliable and enforceable governmental control that will prevent exposure to Site related contaminants that exceed MCLs. These well regulations will also provide a method for EPA to track and confirm where and when any new wells have been installed in the area of the site-related plume. This well ordinance is in effect for those areas that are potentially affected by the Site. Therefore, the ROD requirement for Deed Restrictions to prohibit the installation of new wells in areas of contamination which do not meet the groundwater clean-up goals is currently met through the implementation of this MCHD Regulation.

The Crater PRP Group submitted an IC Work Plan; EPA reviewed and provided comments on February 17, 2011. The IC Work Plan presents the identified ICs for each OU, completed ICs, ICs requiring completion, and parties responsible for implementation. A summary of ICs for each OU follows.

#### *OU1 and OU2*

Identified ICs include deed notices identifying the presence of the quarries and associated contamination, deed restriction to provide notice before the cap can be disturbed, deed restriction prohibiting construction on the cap other than paving and utilities, a perpetual agreement for cover maintenance, and access agreements for inspections during construction and long-term monitoring of the cap and for the Group to conduct cap repairs should current or future land owners fail to make repairs. ICs preventing disturbance of contaminated soils under the cap in the buffer zone or parking lot without EPA approval are required. ICs are currently in place to prohibit residential use. Agreements are in place to conduct inspection and maintenance. ICs requiring vapor intrusion mitigation systems may be required, pending assessments of the existing buildings.

#### *OU3*

Identified ICs include prohibition of residential use (deed notice), notification and approvals for disturbance of final grade of the remediated quarry (deed notice), access agreements to conduct inspections and maintenance (easement), a perpetual maintenance agreement to maintain final surface drainage features (deed notice), and easements for storm water discharge. ICs are in place with the exception of a deed notice to prohibit residential use of the Gulph Mills Golf Club-owned section of the quarry which must be filed with the Recorder of Deeds.



#### *OU4*

Land use controls will be developed after completion of the Demonstration Project. Liberty will prepare an IC work plan specific to Quarry 4.

#### *OU5*

Since the soils along the pipeline were remediated to non-residential standards on the 2301 Renaissance Boulevard property, Liberty will implement an institutional control for the property to notify any future owners of the need for additional assessment in the event of residential use or development along the pipeline alignment. The notification will be included in the deed to the 2301 Renaissance Boulevard property upon any future transfer of this property by Liberty to a new owner. The remedial activities at 3000 Horizon Drive and on the Williamsburg Commons properties have removed the remaining sections of pipeline and all soils that exceeded residential standards; therefore no additional ICs are required at these locations.

#### *OU6*

Prohibitions on groundwater use are detailed above. The ROD requirement for ICs to prohibit the installation of new wells in areas of contamination which do not meet the groundwater clean-up goals is currently met through the implementation of the MCHD Regulation.

#### *OU7*

Liberty has completed the RA for the CSFA. Liberty will implement an institutional control for the CSFA at the 2301 Renaissance Boulevard property to notify any future owners of the need for additional assessment in the event of residential use or development of the CSFA. The notification will be included in the deed to the 2301 Renaissance Boulevard property upon any future transfer of this property by Liberty to a new owner.

#### *OU8, OU9, and OU10*

ICs for each of these parcels include a deed notice prohibiting residential use. These ICs have been executed.

### **System Operation/Operation and Maintenance**

O&M Plans providing a schedule for inspections and plan for maintenance and corrective actions, if needed, are included in the RD documents for each OU. Long-term maintenance activities are not required for OU5, OU7, OU8, OU9, and OU10 as contaminated materials were removed and no permanent structures were constructed as part of the RA. O&M activities were

limited to warranty work related to restoration of the properties with regard to grading, erosion, and establishment of vegetation. These activities have been completed.

O&M activities for OU1 and OU2 will be implemented after construction of the final cap and will include maintenance of the asphalt surface, drainage structures, monuments, and vegetation. Temporary O&M measures prior to RA completion include the maintenance of fencing around the quarries to restrict access. The O&M Plan requires that the asphalt seal coat be applied within 24 months of completion of the caps with a new application every 4 years thereafter. The pavement over the cap will be inspected annually for cracking and deterioration and ponding and the storm water drainage system will be inspected; therefore the inspection should be conducted during or immediately after a significant rainfall event. If an inspection reveals significant cracking or deterioration, these will be repaired. If areas of ponded water greater than 100 square feet or 2 inches in depth are observed, these areas will be repaired. If depressions with a diameter to depth ratio less than 10 are present, then these areas will be excavated to the pavement subgrade and repaved.

The inlets for the storm water drainage and conveyance system at Quarries 1 and 2 will be inspected monthly during or immediately after a rainfall event to evaluate their effectiveness. Debris will be removed and disposed off-site. The subsurface pipes will be inspected annually and repairs made as needed. The boundaries for the limits of Quarries 1 and 2, the limits of the caps at the quarries, and boundaries depicting restricted areas where excavation cannot be conducted without EPA approval will be marked at a minimum of 50-foot intervals with labels depicting the boundary and a notice that excavation is prohibited without EPA approval. The markers shall be maintained, protected and replaced, if needed. Vegetation used for landscaping within the cap boundaries will be inspected quarterly at a minimum to ensure that only shallow rooting plants are present. Any deeper rooting vegetation will be immediately removed.

Year One O&M activities at Quarry 3 (OU3) included inspections of the vegetative cover for growth and erosion, inspection of the skimmer for proper operation and accumulation of sediment, and inspection of the surface water outlet structure for debris. These inspections were scheduled monthly for the first four months and bi-monthly for the remainder of the year. Long-term O&M requires quarterly inspections for Year Two and semi-annually thereafter and includes an inspection of the cover and outlet structure. Ruts in the cover greater than six inches will require soil fill and reseeding. Debris from the outlet structure will also be removed. Rip rap at the outlet will also be repaired/replaced as needed. Inspections were conducted in August 2010, September 2010, October 2010, November 2010, January 2011, February 2011, March 2011, and May 2011. Results of initial O&M inspections indicated that additional seeding was needed in areas of the quarry; this work has been completed; however, the May 2011 inspection identified additional seeding in limited areas of the quarry.

The Quarry 4 (OU4) Demonstration Project and MNA (OU6) activities only involve groundwater sampling at this time. O&M activities include only the maintenance of monitoring wells. Wells are inspected during each sampling event and any problems are to be noted and repaired.

## V. Progress Since the Last Review

As detailed in the remedy implementation section above, activities have been implemented at all OUs since the last Five-Year Review with the exception of OU7 where construction was completed prior to the last review. Construction has been completed at OU3, OU5, OU8, OU9, and OU10 since the last Five-Year Review. RA activities are ongoing at OU1 and OU2; temporary caps have been placed on Quarry 1 and Quarry 2 to prevent direct contact with contaminated materials. Investigation activities have been implemented to evaluate groundwater conditions at OU4 and OU6 and an indoor air quality investigation was completed at the Kindercare Learning Center to evaluate potential impacts of vapor intrusion from contaminants in groundwater.

### Protectiveness Statement From Previous Five-Year Review

The previous Five-Year Review included the following Protectiveness Statement: "The remedy is considered protective of human health and the environment in the short term as there is no current exposure to contaminated groundwater because residents are on a public water system, and the access to Quarries 1, 2 and 3 is restricted. In addition, any contamination associated with OU5 (WAL Pipeline), OU8 (Area 6), OU9 (Southeast Property Area), and OU10 (Lot 7) is located below the ground surface. EPA expects the site will be fully protective of human health and the environment when the groundwater cleanup goals are met, and all the contaminated soils are either capped or removed for off-site disposal".

Since the previous Five-Year Review, the remedies at OU3, OU5, OU8, OU9, and OU10 have been completed further reducing the potential for exposure to site-related contaminants. Contaminated materials and soils at OU1 and OU2 have been placed under a temporary cover and access is restricted.

### Status of Recommendations and Follow-Up Actions From Previous Five-Year Review

The first Five-Year Review identified two issues and recommendations for follow-up action:

1. New areas of concern were identified near OU8 (Area 6). The recommended follow up action was to finalize ongoing investigations and risk assessments for these areas. These areas are designated OU9 and OU10. As detailed in Section IV – Remedial Actions, investigations and risk assessments were completed for these OUs. RD and RA activities have also been completed at both areas.
2. Reassessment of the cleanup levels was recommended as the main risk assessment was completed in 1999. Toxicity factors have changed for several chemicals and the recommendation was to reassess the protectiveness of the clean up

levels. During this Five-Year Review, all post-excavation data and risk assessments and groundwater sampling results were compiled and reviewed by EPA toxicologists. These data were evaluated with regard to the most recent toxicity factors to determine if cleanup levels specified in the ROD remain protective.

## **VI. Five-Year Review Process**

### **Administrative Components**

The Crater Resources Five-Year Review Team was led by Joseph McDowell (EPA Remedial Project Manager (RPM)), with EPA technical support staff Bruce Rundell (Hydrogeologist), Jennifer Hubbard (Toxicologist), Patti Miller (Regional Counsel) and Bill Hudson (Community Involvement Coordinator (CIC)). Megan Harkins, PADEP Project Officer, assisted in the review as the representative of the support agency. The RPM notified the Crater PRP Group in correspondence dated February 22, 2011 of the statutory requirement for EPA to conduct a five-year review at the Site.

### **Community Involvement**

An advertisement appeared in the Times Herald on May 18, 2011, indicating that EPA was conducting a five-year review for the Site. The advertisement provided point of contact information, and identified the location of the information repositories for the Site.

On April 8, 2011, the RPM notified the Vice-Chairman of the Township Board of Supervisors (BOS) to provide an advance notice that EPA was conducting a five-year review for the Site. The RPM met with the Vice-Chairman of the BOS and the Township Manager at the Upper Merion Township Building on April 11, 2011 to provide a summary of the ongoing review and to answer any questions which have been raised by the residents or the elected officials.

### **Document Review**

A list of documents reviewed can be found in Attachment 5. Documents reviewed in the process of conducting this five-year review included the ROD, the past five years' worth of annual and monthly status reports, Remedial Design Reports, Risk Assessment Reports, RA Completion Reports, and the data collected over the past five years. The Applicable or Relevant and Appropriate Requirements (ARARs) listed in the 2000 ROD were also reviewed, and are presented here in Attachment 6. In addition, numerous work plans and comments submitted regarding work plans were reviewed.

### **Data Review**

The past five years' worth of site investigation and construction quality assurance data was reviewed. Post-remediation sampling was done for each OU as described in the Remedy Implementation section, and that data evaluation as it relates to updated risk assessments is addressed in the Technical Assessment that follows. Groundwater monitoring for OU4 and OU6 is being implemented. Both OUs are in the initial year of monitoring; therefore, there is no statistical strength in the data to determine if performance standards and RAOs will be met.

## Site Inspection

The Site visit was conducted on April 13, 2011. The Crater Resources Five-Year Review Site Inspection was led by Joseph McDowell (EPA RPM), with Bruce Rundell (EPA Hydrogeologist), Megan Harkins (PADEP Project Officer), John Zatyczyc (PADEP Hydrogeologist), Andrew Frebowitz (Tetra Tech Project Manager), Kevin Kilmartin (Tetra Tech Hydrogeologist), Thomas Legel (Advanced Geoservices Corporation Project Manager representing the PRP Group), and Michael Christie (Penn E&R Project Manager representing LPT) participating in the inspection. The Site Inspection encompassed all ten OUs. Access restrictions (fences) were found to be in working condition. No new construction or development had occurred since the previous site visit by the RPM on September 29, 2010. All monitoring wells were locked and in good condition. The temporary covers at Quarry 1 and 2 were functioning as designed. Quarry 3 has been fully restored with the exception of minor vegetation work. The work areas associated with OU5, OU7, OU8, OU9, and OU10 have been fully restored as designed.

## Interviews

Interviews were conducted with the UMT officials and BOS as discussed above in the Community Involvement Section. No information provided suggested any problems with the Site or the ongoing designs or investigations.

## VII. Technical Assessment

- *Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The remedy as discussed in Section IV, Remedy Implementation is functioning as intended by the 2000 ROD. The remedy at OU1, OU2, and OU4 are still in progress. Implementation of the Institutional Controls is also discussed in Section IV, Remedy Implementation.

- *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?*

### Changes in Standards and TBCs

*Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TBCs used in selecting cleanup levels at the site changed, and could this affect the protectiveness of the remedy?*

The performance standards listed in Table 13 of the ROD still meet federal MCLs and non-zero MCLGs. Therefore, the remedy is still protective in this respect.

### Changes in Exposure Pathways

*Has land use or expected land use on or near the site changed? Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there newly identified contaminants or contaminant sources? Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents? Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?*

The anticipated land uses were largely commercial (e.g., office space), and current development plans generally follow these expected uses. A hotel has been proposed for one of the parcels, and a few of the areas where the pipeline was excavated were in residential neighborhoods. One area adjacent to the property contains a golf course. A day-care center located near one of the Crater Resources parcels was sampled to rule out site-related vapor intrusion. Evaluations of the Crater Site have used the appropriate receptors.

Because buildings have been built or are proposed for a site with subsurface contamination, vapor intrusion is a consideration. The chemicals of concern at this site are largely semi-volatile chemicals and metals, although some of the chemicals (most notably acetone, benzene, chloroform, and naphthalene) do display characteristics of volatility. While the likelihood that vapor intrusion would be an issue is less at this site than at other sites, such as sites where the contamination is largely solvent-based, the possibility cannot be ruled out with existing information.

### Changes in Toxicity and Other Contaminant Characteristics

*Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?*

The original risk assessment for this site was completed in 1999. Toxicity factors have changed since then for several chemicals. However, as the parcels have undergone remediation, they have also been subjected to updated risk assessments and confirmation sampling.

As part of this Five-Year Review, the EPA toxicologist examined the post-remediation data to verify that existing concentrations remain protective.

### **OUI**

Three sets of post-excavation soil data associated with OUI (Quarry 1) were available: Boring 141/203, WAL outside Quarry 1, and the Golf Course. This area is used for offices, and has land use controls to prevent residential use (however, it is assumed that the Golf Course, which is off-property, could have unrestricted use in the future).

The existing data were screened against the fall 2010 Regional Screening Levels (RSLs) at cancer risks of  $1\text{E-}6$  and Hazard Quotients (HQs) of 0.1; industrial use was assumed except for the Golf Course, where residential RSLs were also used. A simplified assessment using maximum concentrations was performed on any chemicals that exceeded the RSLs. If the maximum produced unacceptable risk, then the Upper Confidence Limit (UCL) on the mean—the actual concentration that would be used in a risk assessment—was tested. Chemicals significantly contributing to a total cancer risk above  $1\text{E-}4$  or an HQ of 1 were assessed for attribution to background; only site-related chemicals not attributed to background were included in the final risk estimates. Using these procedures (hereafter referred to as the “FYR screening”), the OU1 data were protective for workers.

For future residents in the Golf Course area, screening risks for potential residents slightly exceed the residential Hazard Index (HI) of 1 for iron (ingestion HI 2 for children). Iron is common in the environment, although its concentrations at this location could not be attributed to background. Iron is not usually known for its toxicity, although overdoses can cause gastrointestinal upset. It is also an essential element, and its actual absorption in the human body is typically controlled homeostatically, and varies with the diet. Therefore, there is considerable uncertainty associated with this risk estimate.

## **OU2**

Two sets of post-excavation soil data associated with OU2 (Quarry 2) were available. The area is used for an office park, and has land use controls to prevent residential use.

The existing data underwent the FYR screening process described above, and were found to be protective for workers.

## **OU3**

Eleven sets of soil data associated with OU3 (Quarry 3) were available (Pond 1, Pond 2, Pond 3, Plateau, Periphery north of Pond 3, Periphery SB8, Periphery SB17, Periphery SB7, Periphery SB1, Stone Haul road, and Renaissance Blvd. lot). This OU contained an open quarry (the former site of the three ponds) and is otherwise expected to be used as an office park, with land use controls. Controls are generally in place; however, a deed notice to prohibit residential use of the part of the quarry owned by the golf club remains to be filed.

The existing data underwent the FYR screening process described above, and were found to be protective for workers.

## **OU4**

Soil samples from the cover material in the vicinity of OU4 (Quarry 4) were available; this is the only exposed material. The land is used as an office park and OU-specific controls have not been placed yet, although there are reportedly controls applicable to the office park as a whole.

The existing soil data underwent the FYR screening process described above, and were found to be protective for workers.

Groundwater data (upgradient and downgradient) were also collected to help indicate whether OU4 contributes significantly to groundwater contamination. The data were screened against current tap water RSLs as well as MCLs. (Dissolved data were used for the metals.) All chemicals that exceeded RSLs or MCLs have already been identified in the ROD as chemicals of concern with cleanup standards, except for 1,1,2,2-tetrachloroethane. This chemical was reported at trace levels up to 0.28 ug/L, which is below the 1E-5 cancer risk level and does not warrant addition to the list of chemicals of concern. The protectiveness of the ROD groundwater standards is discussed below under OU6.

## **OU5**

Soil samples were available from three parcels associated with the WAL Pipeline: Liberty, Williamsburg Commons, and O'Neill. The Williamsburg property is in an area zoned for residential use, while the Liberty 3000 Horizon property is part of an office park; both were evaluated for unrestricted use. The O'Neill parcel is part of an office park that has land-use controls applicable to the office park as a whole. O'Neill's institutional controls include a deed restriction prohibiting disturbance of impacted areas other than paving without EPA approval, and a deed notice identifying the presence of the pipeline and associated soil contamination not removed from below buildings and paved areas.

The existing soil data underwent the FYR screening process described above, and were found to be protective for workers. The Liberty and Williamsburg properties were also evaluated for residents. At the Liberty property, the manganese HI would be about 3 using the fairly conservative dust-generation factor from the RI. The default dust-generation factor is about three orders of magnitude less conservative, so there is considerable uncertainty around this number. Manganese is also a common element, especially in Pennsylvania, although its concentrations at the Liberty property could not be attributed to background. Using the FYR screening process, the Williamsburg property was found to be protective for residents.

## **OU6**

OU6 is the operable unit for groundwater. The data were screened against current tap water RSLs as well as MCLs. (Dissolved data were used for the metals.) All chemicals that exceeded RSLs or MCLs have already been identified in the ROD as chemicals of concern with cleanup standards, except for ethylbenzene, xylenes, and 2-methylnaphthalene. These chemicals were detected up to 4.2 ug/L, 81 ug/L, and 24 ug/L, respectively. Even at the maximum concentrations, the contribution of ethylbenzene to the cancer risk would be below the 1E-5 cancer risk level, and of 2-methylnaphthalene to the HI would be less than 0.2. Xylenes would add less than 0.4.



The groundwater cleanup standards from Table 13 in the ROD were examined to determine whether they remain protective. They all meet current MCLs. However, using the ROD standards for the contaminants identified in the ROD with updated toxicity factors and default exposure guidance, the following chemicals exceed EPA's target risks of an HI 1 or less, or a cancer risk of 1E-6 to 1E-4 or less:

Center of Plume: Dibenzofuran and phenol (child HI); chromium (cancer risk)

Extent of Plume: Cobalt (adult and child HI); chromium (cancer risk)

The chromium assumptions are quite conservative, and the chromium ROD goals must be tempered by consideration of background, as stated in the ROD, page 55: "It should be noted that background soil and groundwater conditions may ultimately supercede some of the low inorganic cleanup standards." Preliminary background data (Interim Data Submittal, May 2011) indicate that background may be similar to or even higher than the ROD standards for chromium.

Similarly, cobalt will ultimately need to be compared to background as well, although the preliminary data do not suggest, at this point, that the ROD standard is below background for this element.

For dibenzofuran, the toxicity factor is a "PPRTV Appendix value," which means that it is not only provisional, but the data did not meet typical criteria to derive a provisional reference dose (RfD). As sufficient data were available to suggest a toxicity value, the "appendix value" is a provisional recommendation that is considered a better alternative than assuming zero toxicity. Therefore, there is high uncertainty associated with this number, and it could easily change in the future.

For phenol, the risk is driven by ingestion, using a toxicity factor from EPA's Integrated Risk Information System (IRIS). This value has been peer-reviewed, and IRIS values are generally less subject to change than provisional toxicity values. IRIS values do receive reassessment from time to time, and could change before the groundwater remediation is finished. However, the phenol values were set in 2002 and are not currently scheduled for reassessment.

These matters only affect the future protectiveness of the groundwater remedy. Since no one is currently using groundwater in the vicinity of the site as a source of drinking water, current conditions are protective as far as drinking water uses. As noted previously, vapor intrusion is also a potential consideration.

## **OU7**

The intended use of this parcel is for offices and parking. While parcel-specific land-use controls do not exist, there are reportedly office-park-wide controls. Cinder slag fill was excavated from this area.

The existing soil data underwent the FYR screening process described above, and were found to be protective for workers.

## **OU8**

The intended use of this parcel is reportedly for offices. Potential use as a hotel lot has been considered. However, the parcel was evaluated in 2010 and found not to be acceptable for unrestricted (e.g., residential) use. The parcel has land-use controls prohibiting residential use.

The existing soil data underwent the FYR screening process described above, and were found to be protective for workers, although the highest detection for manganese may constitute a small hot spot. On average, however, the manganese concentrations were not significantly different from background.

## **OU9**

This parcel is a vacant field zoned for commercial use; it is in the same parcel with the same land-use controls as OU8. The parcel was evaluated in 2010 and found not to be acceptable for unrestricted (e.g., residential) use. The parcel has land-use controls prohibiting residential use.

Cinder slag fill was excavated from this area. The remaining soil samples underwent the FYR screening process described above, and were found to be protective for workers.

## **OU10**

This parcel was a steeply sloping grassy area underlain by naphthalene contamination. Soil was excavated, and the remaining soil was sampled. The parcel was evaluated in 2010 and found not to be acceptable for unrestricted (e.g., residential) use. The parcel has land-use controls prohibiting residential use.

The existing soil data underwent the FYR screening process described above, and were found to be protective for workers.

## **Day Care**

A day-care center near OU10 was sampled to ensure that site-related subsurface contamination was not posing a threat to workers or children. No significant site-related vapor intrusion or vapor accumulation beneath the slab was observed. Risks from the reported concentrations are within the acceptable range.

*Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?*

No.

## Changes in Risk Assessment Methods

*Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?*

There have been some changes in EPA's risk assessment guidance since 1999, involving changes in dermal and inhalation risk methodology, as well as an increase in the estimated carcinogenicity of chemicals that act as mutagens (such as chromium and PAHs). Current methodology was used in the FYR screening process described above, to update the evaluation of protectiveness.

## Expected Progress Towards Meeting Remedial Action Objectives

*Is the remedy progressing as expected?*

Yes. The RAO of restoring groundwater to its beneficial use (as drinking water) has yet to be achieved, but the MNA sampling program is now underway. The RAO of preventing future exposure to Site-related groundwater is currently being met through a combination of ICs, which restrict the installation or use of groundwater wells. The RAO of eliminating exposure to soil/sediment which present an unacceptable risk to human health has been met with the removal of contaminated soils; however, the vapor intrusion assessment for the commercial office buildings that currently exist or are proposed to be constructed adjacent to Quarries 1 and 2 or above the groundwater plume has not been completed. The RAO of preventing contact of soil/sediment constituents with other media such as groundwater and surface water which may transport the contamination will be met once the Quarry 1 and Quarry 2 caps are constructed. The RAO of limiting exposure of ecological receptors to affected surface water in the Quarry 3 pond water has been met now that the Quarry 3 clean-up is complete. Implementation of the Institutional Controls is discussed in Section IV, Remedy Implementation; not all ICs are in place.

- *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No new information has been found that calls into question the protectiveness of the remedy.

## **Technical Assessment Summary**

According to the data reviewed, the site inspection, and the interviews, the remedy where implemented, is functioning as intended by the ROD. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The protectiveness of the cleanup levels in light of changes to some risk assessment factors has been evaluated for long-term protectiveness.

## VIII. Issues

The table below summarizes the issues that have been identified during this Five-Year Review for the Crater Resources Site.

**Table 3: Issues**

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Potential for vapor intrusion at existing or proposed buildings adjacent to Quarries 1 and 2 or above the groundwater plume	Y	Y
2. Institutional controls have not been fully implemented across the site	N	Y

## IX. Recommendations and Follow-up Actions

Completion of the Vapor Intrusion Assessment at the Site and implementation of the remaining institutional controls are required.

**Table 4: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1.	Complete Vapor Intrusion Assessment at potentially impacted buildings	EPA, Respondents	EPA, PADEP	3/30/2013	Y	Y
2.	Finalize Institutional Controls	EPA, Respondents	EPA	3/30/2013	N	Y

## X. Protectiveness Statement

As noted above, the remedy is being implemented in accordance with the ROD. Remedial Action has been completed at several OUs (OU3, OU5, OU7, OU8, OU9, and OU10) and work is underway at OU1 and OU2. A demonstration project is underway to evaluate the need for a cap on Quarry 4 (OU4), and sampling has been initiated to evaluate the MNA groundwater remedy (OU6). While no one is currently using groundwater in the vicinity of the site as a source of drinking water, a determination regarding the short-term protectiveness of the groundwater remedy is being deferred until further information is obtained regarding the potential for vapor intrusion at the commercial office buildings that currently exist or are proposed to be constructed adjacent to Quarries 1 and 2 or above the groundwater plume. The

time required to collect the air quality data, evaluate the information, and submit a report to EPA and PADEP will be about eighteen months for the existing buildings. After EPA and PADEP have reviewed the data and report, EPA will make a protectiveness determination regarding the vapor intrusion pathway. EPA expects the site will be fully protective of human health and the environment when the groundwater cleanup goals are met, all institutional controls are in place, and all the contaminated soils are either capped or removed for off-site disposal.

## **XI. Next Review**

EPA will conduct another five-year review within five years of the completion of this five-year review report. The completion date is the date of the signature on the front of this report.

## **ATTACHMENTS**

ATTACHMENT 1: Site Location Map  
Crater Resources Site  
Upper Merion Township, Pennsylvania



SOURCE: USGS TOPOGRAPHICAL QUADRANGLE, NORRISTOWN, PENNSYLVANIA

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SITE LOCATION MAP  
CRATER RESOURCES SUPERFUND SITE  
UPPER MERION TOWNSHIP, PENNSYLVANIA

PROJECT ENGINEER:	T.M.L.	SCALE:	N.T.S.
CHECKED BY:	A.H.C.	PROJECT NUMBER:	2001-847-03
DRAWN BY:	P.S.G.	DATE:	5/3/07
		FIGURE:	2-1

AR300854



**ATTACHMENT 2  
SITE PLAN**

The map shows the following parcels and owners:

- Former WAL Pipeline Alignment** (indicated by a line across the top right)
- Swedeland Development Corporation Parcel** (indicated by an arrow pointing to a parcel on the right)
- RAGM Holdings Company Parcel** (indicated by an arrow pointing to a parcel at the top right)
- 3000 Horizon Drive** (indicated by an arrow pointing to a road on the right)
- Williamsburg Commons Parcel** (indicated by an arrow pointing to a parcel on the right)
- Liberty Parcels** (multiple locations, indicated by arrows pointing to various parcels)
- RAGM NORTH OFFICE BUILDING** (indicated by an arrow pointing to a building on the left)
- HORIZON EAST OFFICE BUILDING** (indicated by an arrow pointing to a building on the left)
- CRISTAL OFFICE BUILDING** (indicated by an arrow pointing to a building on the right)
- COMMONS OFFICE BUILDING** (indicated by an arrow pointing to a building on the right)
- 2300** (indicated by an arrow pointing to a parcel on the left)
- 2500** (indicated by an arrow pointing to a parcel on the left)
- 2301** (indicated by an arrow pointing to a parcel on the left)
- 2201** (indicated by an arrow pointing to a parcel on the left)
- 2901** (indicated by an arrow pointing to a parcel on the left)
- 2701** (indicated by an arrow pointing to a parcel on the left)
- 2501** (indicated by an arrow pointing to a parcel on the left)
- O'Neill Parcels** (indicated by an arrow pointing to a parcel on the left)
- Cinder/Slag Fill Area** (indicated by an arrow pointing to a circular area on the left)
- QUARRY** (multiple locations, indicated by arrows pointing to various areas)
- Crater Resources Inc. Parcel** (indicated by an arrow pointing to a parcel on the left)
- Area 6** (indicated by an arrow pointing to a circular area on the right)
- Southeast Property Area** (indicated by an arrow pointing to a parcel on the right)
- Out Parcels Inc. Parcel (Lot 44)** (indicated by an arrow pointing to a parcel on the right)
- Each Parcel As Is Parcel (Lot 7)** (indicated by an arrow pointing to a parcel on the right)
- Gulph Mills Golf Club Parcel** (indicated by an arrow pointing to a parcel at the bottom left)

AR300855





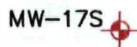
#### LEGEND :



— APPROXIMATE LIMIT OF QUARRY



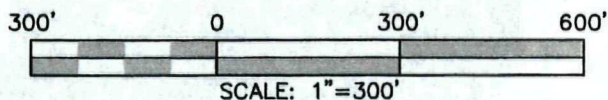
— APPROXIMATE PROPERTY BOUNDARY FOR 2201 RENAISSANCE BOULEVARD.



— MONITORING WELL LOCATION

#### NOTES :

- (1) BOUNDARY FOR QUARRY No.4 OBTAINED FROM HISTORICAL AERIAL PHOTOGRAPHS.



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DWG FILE  
H44013  
DESIGNED BY  
MCC  
DRAWN BY  
J.W.  
CHECKED BY  
MAG  
DATE  
12/21/2010

#### ATTACHMENT 3

SITE MAP SHOWING THE GROUND WATER  
MONITORING WELL NETWORK FOR THE  
QUARRY No.4 DEMONSTRATION PROJECT  
UPPER MERION TOWNSHIP, MONTGOMERY COUNTY PA

SCALE: 1"=200'

FIGURE NO.

SHEET NO.

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## **ATTACHMENT 5: List of Documents Reviewed**

Crater Resources Superfund Site Record of Decision. U.S. EPA Region III; September 27, 2000.

Administrative Order No. 3-2001-0009 In The Matter Of: Crater Resources Superfund Site; Beazer East, Inc., Crater Resources, Inc., Each Parcel As Is, Inc., Gulph Mills Golf Club, Inc., Keystone Coke Company, Inc., Liberty Property Limited Partnership, Liberty Property Trust, Vesper Corporation Respondents. April 30, 2001.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2009 – June 2010. Penn E&R, Inc.; July 7, 2010.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2008 – June 2009. Penn E&R, Inc.; July 7, 2009.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2007 – June 2008. Penn E&R, Inc.; July 7, 2008.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2006 – June 2007. Penn E&R, Inc.; July 7, 2007.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2005 – June 2006. Penn E&R, Inc.; July 7, 2006.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2004 – June 2005. Penn E&R, Inc.; July 7, 2005.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2003 – June 2004. Penn E&R, Inc.; July 7, 2004.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2002 – June 2003. Penn E&R, Inc.; July 3, 2003.

Annual Status Report for the LPT Carve Out Under the UAO; Crater Resources Superfund Site; July 2001 – June 2002. Penn E&R, Inc.; July 5, 2002.

Annual Status Report No. 9 (July 2010 – June 2011); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 1, 2011.

Annual Status Report No. 9 (July 2009 – June 2010); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 2, 2010.

Annual Status Report No. 8 (July 2008 – June 2009); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 2, 2009.

Annual Status Report No. 7 (July 2007 – June 2008); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 1, 2008.

Annual Status Report No. 6 (July 2006 – June 2007); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 5, 2007.

Annual Status Report No. 5 (July 2005 – June 2006); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 5, 2006.

Annual Status Report No. 4 (July 2004 – June 2005); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 5, 2005.

Annual Status Report No. 3 (July 2003 – June 2004); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 2, 2004.

Annual Status Report No. 2 (July 2002 – June 2003); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 8, 2003.

Annual Status Report No. 1 (July 2001 – June 2002); Crater Resources Superfund Site, King of Prussia, PA; Unilateral Administrative Order for Remedial Design and Remedial Action. Leed Environmental, Inc.; July 3, 2002.

Crater Resources Cooperating Respondent Group letter, dated February 21, 2006. This letter forwarded the Restrictive Covenant between the Crater Resources Cooperating Respondent Group, and RAGM Holding Company and Crater Resources, Inc.

Crater Resources Superfund Site Institutional Control Work Plan, dated July 11, 2006

Evaluation of Constituents in Plateau Post Excavation Soils (OU3), dated October 27, 2009

Explanation of Significant Differences, dated April 30, 2009

Final Baseline Risk Assessment Crater Resources Site, dated December 1999

Final Report for the WAL Pipeline Removal (OU5) at 3000 Horizon Drive, dated October 20, 2006

Former WAL Pipeline (OU5) Investigation Report, dated August 4, 2009

Groundwater (OU6) Pre-Design Investigation Report, dated February 1, 2008

Health Risk Assessment for Lot 7 (OU10) and 2001 Commons Associates L.P. Property, dated February 12, 2010

Indoor Air Quality Sampling Plan for the Kindercare Learning Center (OU10), dated January 19, 2009

Indoor Air Quality Report for the Kindercare Learning Center (OU10), dated December 4, 2009

Interim Data Submittal for Natural Attenuation Program, Crater Resources Superfund Site, dated May 16, 2011

Interim Remedial Design Report for the Quarry No. 4 Demonstration Project, dated July 7, 2010

Institutional Controls Work Plan, dated July 11, 2006

Monitored Natural Attenuation Work Plan, dated June 30, 2010

Pipeline (OU5) Removal Work Plan, dated May 17, 2006

Phase II Environmental Assessment Report for 2200 Renaissance Boulevard, dated December 3, 2002

Post-Excavation Risk Evaluation for Former WAL Pipeline (OU5), dated December 3, 2009

Post-Excavation Risk Evaluation for Lot 44/Former Dump Area-Area 6 (OU8) dated January 25, 2010

Post-Excavation Risk Evaluation for Soil for Southeastern Property Area (OU9) dated January 25, 2010

Post-Excavation Risk Evaluation for Soil for Lot 7 (OU10), dated February 12, 2010

Pre-Design Investigation Work Plan for Quarries 1 and 2 (OU1 and OU2), dated July 2, 2001

Pre-Design Investigation Report for Quarries 1 and 2 (OU1 and OU2), dated November 27, 2001

Pre-Design Investigation Work Plan for Area 6 (OU8), dated July 30, 2003; amendment submitted April 13, 2004

Pre-Design Investigation for Monitored Natural Attenuation (OU6), submitted March 9, 2006

Quarry 2 (OU2) WAL Pipeline Investigation and Mitigation Plan, dated June 12, 2005

Remedial Action Report for the Former Cinder/Slag Fill Area Operable Unit 7, dated September 22, 2003

Remedial Action Report for the Former WAL Pipeline (OU5), dated May 26, 2010

Remedial Action Report for Area 6/Lot 44 (OU8), dated July 20, 2010

Remedial Action Report for Southeast Property Area (OU9), dated July 15, 2010

Remedial Action Report for Quarry 3 (OU3), dated December 15, 2010

Remedial Action Completion Report for the Removal of Buried Pipes Located at the Yellow Parcel in the

Renaissance Park Commercial Development, dated May 5, 2000

Remedial Action Work Plan for WAL Pipeline Removal at 3000 Horizon Drive, dated June 23, 2005

Remedial Action Work Plan Addendum for WAL Pipeline Removal at 3000 Horizon Drive, dated May 17, 2006

Remedial Action Work Plan for Quarry 3 (OU3), Phase 1A, dated December 12, 2008 and supplemented on March 13, 2009

Remedial Action Work Plan for Quarry 3 (OU3), Phase 1B, dated May 19, 2009

Remedial Action Work Plan for Quarry 3 (OU3), Phase 2, dated May 8, 2009

Remedial Design for Quarries 1 and 2 (OU1 and OU2), dated March 14, 2008

Remedial Design for Quarry 3 (OU3) Phase 1, dated January 16, 2009

Remedial Design for Quarry 3 (OU3) Phase 2, dated July 7, 2009

Remedial Design and Remedial Action Work Plan for Former Cinder Slag Fill Area (OU7), dated October 10, 2001

Remedial Design and Remedial Action Work Plan for Former WAL Pipeline (OU5), dated September 22, 2010

Remedial Design and Remedial Action Work Plan for Lot 7 (OU10), dated July 14, 2009

Remedial Design and Remedial Action Work Plan for Area 6 (OU8), dated September 25, 2009

Remedial Design and Remedial Action Work Plan for Southeastern Property Area (OU9), dated September 25, 2009

Remedial Design Work Plan for Investigation of Former WAL Pipeline (OU5) at the 3000 Horizon Drive Property, dated March 7, 2005

Remedial Design Work Plan for Quarry 3 (OU3), dated March 27, 2003

Remedial Design Work Plan for the Quarry No. 4 Demonstration Project, dated June 11, 2004

Remedial Design Work Plan for Quarries 1 and 2 (OU1 and OU2), dated May 15, 2005

Remedial Design Work Plan for Pipeline (O'Neill Property), dated June 12, 2005

Remedial Design Work Plan for OU8 and OU9, dated August 3, 2007

Remedial Investigation Report, Crater Resources Site, dated June 4, 1999

Remediation Plan for 4 Areas of Concern (OU1 and OU2), dated March 14, 2007

Remediation Plan for Relocation of Soils From Quarry 1 and Boring 141/203 AOC to Quarry 2, July 24, 2007

Report of Investigations for 4 Areas of Concern (OU1 and OU2), dated July 5, 2006

Report of Results and Streamlined Human Health Risk Assessment for PADEP AOC and Former WAL Pipeline (OU2), dated August 13, 2007

Report of Results for Additional Remedial Actions for PADEP AOC (OU2), dated December 5, 2007

Report of Results for Boring 141/203 Area of Concern (OU1) Final Remedial Action, dated November 4, 2008

Report of Results for WAL Removal Outside of Quarry 1 (OU1), dated August 2008

Report of Results for Remedial Actions – Upper Retention Basin, dated August 29, 2008

Report of Results for Golf Course Area of Concern, dated September 2008

Report of Results for Relocation of Soils – Quarry 1 to Quarry 2, dated January 23, 2009

Revised Retention Basin Sampling and Analysis Plan, dated December 3, 2004

Risk Assessments for 4 Areas of Concern (OU1 and OU2), dated November 13, 2006

Risk Assessment for Operable Unit 8, dated December 2, 2008

Risk Assessment for Former WAL Pipeline (OU5), dated August 4, 2009

Risk Assessment Work Plan for OU8 and OU9, submitted September 9, 2005

Soil Management Plan for Non-Impacted Areas (OU1 and OU2), dated June 18, 2007

Summary Evaluation of the Results of the Soil Cover Investigation and First Two Quarterly Ground Water Sampling Events Associated With the Quarry No. 4 Demonstration Project, dated May 23, 2011

Technical Memorandum for Statistical Analysis of Quarry 3 (OU3) Soils, dated December 18, 2008

Technical Memorandum for Development of Target Naphthalene Concentrations in Quarry 3 (OU3) Soils, dated March 25, 2008



## ATTACHMENT 6: Applicable or Relevant and Appropriate Requirements (ARARs)

[From 2000 Record of Decision]

TABLE 14 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE CRATER RESOURCES SITE					
ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy	
I. CHEMICAL SPECIFIC					
A. Water					
1. Safe Drinking Water Act	42 U.S.C §§300g-1				
a. Maximum Contaminant Levels (MCLs)	40 C.F.R. §§141.11-12 and 141.61-62	Relevant and Appropriate	MCLs are enforceable standards for public drinking water supply systems which have at least 15 service connections or are used by at least 25 persons. These requirements are not directly applicable since ground water in the vicinity of the Site is not used as a private drinking water supply. However, under the circumstances of this Site, MCLs are relevant and appropriate requirements which were considered in establishing ground water cleanup levels.	The groundwater will meet these requirements. The ground water cleanup standards listed on Table 13 of the ROD will meet or exceed the MCLs.	
b. Maximum Contaminant Level Goals (MCLGs)	40 C.F.R. §141.50-51	Relevant and Appropriate	MCLGs are non-enforceable health goals for public water supplies which have at least 15 service connections or are used by 25 persons. Under the circumstances of this Site, MCLGs are relevant and appropriate requirements which were considered in establishing ground water cleanup levels.	The groundwater will meet these requirements. The ground water cleanup standards listed on Table 13 of the ROD will meet or exceed the MCLGs.	



<p align="center">TABLE 14  APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)  AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE  CRATER RESOURCES SITE</p>				
ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
2. Pennsylvania Water Quality Standards	25 PA Code Chapters 93.4a, 93.5-93.7, and 93.8a	Relevant and Appropriate	These are guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants that are allowable at levels which preserve human health based on water and fish ingestion and to preserve aquatic life. Ambient water quality criteria may be relevant and appropriate to CERCLA cleanups based on the uses of a water body.	These requirements will be an ARAR if the discharge associated with Alternative GW-3, if any, is to an on-site surface water. Such on-site discharge would meet the guidelines established for protection of aquatic life.
3. Integrated Risk Information System (IRIS)	EPA Office of Research and Development	To Be Considered	IRIS is an EPA data base containing up-to-date health risk and EPA regulatory information for numerous chemicals. IRIS is the preferred source of toxicity information as it contains only those reference doses (RfDs) and cancer slope factors that have been verified by the RfD or Carcinogen Risk Assessment Verification Endeavor Workgroups.	These non-enforceable toxicity values have been considered while developing site-specific cleanup standards for each remedial alternative.
B. Soil				
1. Risk Assessment Guidance for Superfund - Volume 1 Human Health Manual Part A, December 1989	EPA Office of Emergency and Remedial Response EPA/540/1-89/002	To be Considered	EPA guidance for calculating baseline human health risk and establishing risk-based performance standards for Superfund clean-ups. Section 7.4 sets forth method for identifying appropriate toxicity values for contaminants of concern.	There are currently no ARARs establishing acceptable concentrations for contaminants in soil or sediment at the Site. This guidance document was considered when establishing risk based cleanup standards.
Pennsylvania Act 2 Program - Statewide Health Standards for soils	PA Code Chapter 250.305	Applicable	This regulation establishes requirements for voluntary cleanup activities.	Where Act 2's statewide health standards for soils provide more stringent requirements than the risk-based cleanup standards for the site, EPA has incorporated these more stringent requirements as cleanup standards in Table 12.

<p align="center"><b>TABLE 14</b>  <b>APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)</b>  <b>AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE</b>  <b>CRATER RESOURCES SITE</b></p>				
ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARS in the Context of the Remedy
<b>II. LOCATION SPECIFIC</b>				
1. Pennsylvania Wetland Regulations	25 PA Code Chapter 105.18a	Applicable	Protects wetlands of the Commonwealth from dredging, filling, removal, or other alteration and requires Commonwealth oversight and approval.	The substantive requirements of these regulations shall be applicable if construction of the cap, or discharge to surface water impacts regulated wetlands, if any:
2. Preservation of Historical & Archaeological Data Act	16 U.S.C. § 469	Applicable	Requires actions to avoid potential loss or destruction of significant scientific, historical, or archaeological data.	Actions shall be taken to mitigate any adverse effects on identified off-site historic resources that might result from implementation of the remedial action.
<b>III. ACTION SPECIFIC</b>				
<b>A. Water</b>				
1. Clean Water Act (CWA); Pennsylvania National Pollutant Discharge Elimination System Requirements;	40 CFR Part 125.3 40 CFR Part 122.44-45 25 PA Code Chapters 95.1 - 95.3	Applicable	Establishes substantive requirements and limits for discharges to waters of Pennsylvania and the United States.	These requirements will be an ARAR if the discharge associated with Alternative GW-3, if at all, is to an on-site surface water source. Such on-site discharge would comply with these discharge standards.
2. Storm Water Management Act	32 P.S. § 680.13	Applicable	Requires implementation of stormwater control measures to prevent injury to health, safety, or property.	Stormwater shall be managed to control stormwater during construction of the remedy.
3. Erosion and Sediment Control	25 PA Code 102.4(b)(1), 102.11, 102.22	Applicable	Identifies erosion and sediment control requirements and criteria for activities involving land clearing, grading and other earth disturbances and establishes erosion and sediment control criteria.	These regulations apply to construction activities at the Site which disturb the ground surface, including clearing, grading, excavation and cap installation.

**TABLE 14**  
**APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)**  
**AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE**  
**CRATER RESOURCES SITE**

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
4. Use of Monitored Natural Attenuation at Superfund, Resource Conservation and Recovery Act (RCRA) Corrective Action, and Underground Storage Tank Sites, April 1999	OSWER Directive 9200.4-17R	To Be Considered	This policy provides guidance for evaluating and approving monitored natural attenuation remedies.	This policy shall be considered during the implementation of the monitored natural attenuation remedy.
<b>B. Air</b>				
1. Air Emission Standards for Process Vents	40 C.F.R. Part 264.1030 through 264.1034 and 40 CFR Part 264.1053 - 264.1063	Relevant and Appropriate	Establishes requirements for process vents and equipment leaks.	Emissions due to potential leaks from the contingent treatment plant would comply with this requirement.
2. Federal Regulations Governing Hazardous Air Pollutants (NESHAPS)	40 CFR 61.242-1 through 61.244	Relevant and Appropriate	Requires emissions of Hazardous Air Pollutants (HAPs) from new and existing sources to be quantified; establishes ambient air quality standards and emissions limitations for HAP emissions from new sources.	The excavation of the PAH - contaminated materials in Quarry 3 will comply with the HAP Standards.
3. Control of Air Emissions from Air Strippers at Superfund Groundwater Sites, June 15, 1989	OSWER Directive 9355.0-28	To Be Considered	This policy relates to the selection of control for air strippers at ground water sites according to the air quality status of the area of the site (i.e., whether it is an attainment or non-attainment area).	This policy shall be considered in determining if air emission controls are necessary for the air stripper. Sources most in need of the controls are those with emissions rates in excess of 3 lbs./hour or 15 lbs./day or a potential rate of 10 tons/year of total VOCs.
4. Fugitive Air Emissions	25 PA Code Chapter 123.1 - 123.2 40 CFR § 50.6 - 50.7	Applicable	Establishes the fugitive dust regulation for particulate matter.	The capping and excavation activities will comply with these regulations.
5. Malodorous Air Emissions	25 PA Code 123.31	Applicable	Prohibits malodors detectable beyond the site property line.	Emissions from the excavation and construction will comply with this requirement.

<p align="center"><b>TABLE 14</b>  <b>APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)</b>  <b>AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE</b>  <b>CRATER RESOURCES SITE</b></p>				
ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
6. Visible Air Emissions	25 PA Code 123.41	Applicable	Establishes opacity limits for visible air emissions.	Emissions from the excavation and construction will comply with this requirement.
7. Pennsylvania Standards for New Stationary Sources	25 PA Code Chapters 121.7 and 127.1	Applicable	Requires all new air emission sources to achieve minimum attainable emissions using best available technology.	Emissions for the contingent groundwater treatment plant would comply with this requirement.
<b>C. Solid Waste</b>				
1. Residual Waste Landfill	25 PA Code 288.234, 288.236 and 288.237, 288.241-244	Relevant and Appropriate	Establishes minimum requirements for closure of residual waste landfills in the Commonwealth, including minimum cap specifications.	The specifications of the cap shall, at a minimum, comply with the Commonwealth of PA closure requirements.
<b>D. Hazardous Waste</b>				
1. Standards applicable to Generators.	25 PA Code 75.262 or 25 PA Code 262a	Applicable	Hazardous waste determination requirements applicable to generators who treat, store, or dispose of hazardous waste.	Any treatment, storage or disposal of soils that are considered hazardous waste shall comply with the more stringent substantive requirements of either 25 PA Code 75.262 or 25 PA Code 262a. <sup>1</sup>
2. Standards for Owners and Operators of Hazardous Waste TSDs	25 PA Code 75.264 or 25 PA Code 264a (Subchapters I, J, and L)	Applicable	Establishes standards for storing hazardous waste on-site.	In the event that excavated soil or sediments are hazardous waste, the material shall be stored in accordance with the more stringent substantive requirements of either 25 Pa. Code 75.264 or 25 Pa. Code 264a (Subchapters I, J, and L) concerning the manner of storage. <sup>2</sup>

TABLE 14 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) AND TO BE CONSIDERED MATERIAL (TBCs) FOR THE CRATER RESOURCES SITE				
ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
E. Residual Waste				
1. Residual Waste Regulations	25 PA Code 299.101-133 25 PA Code 299.211-215	Applicable	Establishes the criteria for storing residual waste.	In the event the soils and sediments are not considered hazardous waste, the substantive requirements for storage and transportation of residual waste apply.

<sup>1</sup>25 PA Code 75.262 is part of Pennsylvania's EPA-authorized hazardous waste program. 25 PA Code 262a represents Pennsylvania's new regulation, which is pending authorization from EPA, and will supercede 25 PA Code 75.262.

<sup>2</sup>25 PA Code 75.264 is part of Pennsylvania's EPA-authorized hazardous waste program. 25 PA Code 262a represents Pennsylvania's new regulation, which is pending authorization from EPA, and will supercede 25 PA Code 75.264.